Meta Cookie

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Fig. 1 Marked Cookie

Fig. 2 Meta Cookie

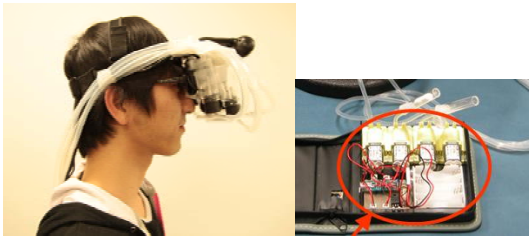

Fig. 3 Visual and Olfactory Display

1. Introduction

So far, gustatory information has rarely been studied in relation to computers, even though there are lots of studies on visual, auditory, haptic and olfactory information. This scarcity of research on gustatory information has several reasons. One reason is that gustatory sensation is based on chemical signals, whose functions have not been fully understood yet. Another reason is that perception of gustatory sensation is affected by other factors, such as vision, olfaction, thermal sensation, and memories. Thus, complexity of cognition mechanism for gustatory sensation as described above makes it difficult to build up a gustatory display.

Our research utilizes the complexity of cognition mechanism for gustatory sensation, in order to create a pseudo-gustatory display, which induces cross-modal effect by presenting scent. Therefore, for the realization of a novel gustatory display system, we aim to establish the method for letting humans feel various tastes without changing chemical substances by changing only accompanying information. In this paper, we propose the method to change perceived taste of a cookie when they eat by changing appearance and smell with augmented reality technology.

2. Meta Cookie: Pseudo-Gustation System

We made the system to change perceived taste of a cookie by overlaying visual and olfactory information onto a real cookie with an AR marker and named it “Meta Cookie” (Fig. 2). “Meta Cookie” consists of four parts: a marked plain cookie, a marker detection unit, a overlaying visual information unit and an olfactory display. In this system, a user wears visual and olfactory display system (Fig. 3). The marker detection unit detects the marked cookie and calculates the 6DOF position of the cookie and a distance between the cookie and the nose of a user. The user can choose one cookie which he/she wants to eat from multiple kinds of cookies. A texture (a photograph of a cookie) and a scent of the cookie which the user selected are overlaid onto the cookie based on the calculated position information.

We made a detectable plain cookie by a camera for this system by reference to Clare’s AR Cookie [1]. Since Clare uses chocolate for the black part of AR cookie, his AR Cookie is chocolate-flavored. Therefore there is a chance that this flavor of chocolate interferes with cross-modal effect which our system evokes to change the perceived taste of a cookie. Consequently, we use a plain cookie on the market and print a AR marker on it by using branding iron. Fig. 1 illustrates our marked cookie.

A camera and ARToolkit are used for the marker detection unit. Visual and olfactory display system consists of a HMD and an air pump- type olfactory display. A Video see-through HMD displays an appearance of several types of cookies (a chocolate cookie, strawberry cookie, tea cookie and so on) on the marked plain cookie based on the calculated position information by using ARToolkit. This visual effect let users feel that they are eating a selected cookie although they are just eating a marked cookie.

Moreover, the air pump- type olfactory display produces a scent of the selected cookie. The olfactory display can eject fresh air and seven kinds of scented air. And it can control strength of these scents in 127 levels. In “Meta Cookie”, the strength of the produced scent is decided on the basis of the calculated position information. Nearer the marked cookie from the user’s nose, stronger scent ejects from the olfactory display. This olfactory information evokes cross-modal effect between olfaction and gustation and let users feel that they are eating a flavored cookie although they are just eating a plain cookie.

Currently more than a dozen people tried “Meta Cookie” and almost all of them answered that they feel a change of taste of the plain cookie by using our system.

References

[1]AR cookies:
http://mikeclaremikeclare.com/index.php?/systems/ar-cookies/

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