Title:
A Multisensory System for Simulating the Wine Tasting Experience

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Introduction:

Commercial products are nowadays conceived and developed so as to capture the attention of potential customers and elicit an emotional reaction by appealing to their senses [5, 7]. Low-cost Virtual, Mixed or Augmented Reality technologies (VR, MR or AR respectively) can support the design process and the evaluation phases of these products. Moreover, these technologies can make easy for designers, with the help of marketing experts and psychologists, to design product multisensory experiences, to quickly test the reaction of the potential customers and finally refine the results [2]. Although many of VR, MR and AR applications rely primarily on visual technologies, there are technologies for other senses such as hearing, touch, and olfaction [1, 3, 4, 6]. We do believe that, by properly integrating all these technologies, it is possible to create simple applications with a considerable potential for product marketing.

In this research activity, we aimed at simulating an interactive wine tasting experience in order: 1) to provide companies with a tool to support for the remote sale of wines; 2) to improve advertisement; 3) as a support tool for teaching people to become wine experts. The multisensory system is based on the integration of MR technologies, of three different sensory modalities, i.e. sight, touch, and smell, in an unconventional way. Specifically, the system has not been conceived with the aim of creating a completely immersive simulation environment, but to create a very simple but effective interactive experience. To this aim, low-cost small technologies have been integrated into real objects, i.e. a real glass, in order to augment the experience that can be delivered to the various human senses. In particular, some sensors detect the actions that a user performs on a real wine glass and communicate it to an application that activates an interactive movie. Through this movie, the user receives instructions on how to experience the wine according to the typical instructions provided by sommeliers and, while he/she does the suggested action, he/she receives tactile and olfactory information related to the type of wine that the glass should contain. In this way, the user is able to experience a number of different simulated wines.

Main Idea:

The concept at the basis of this research consists of a simulated wine tasting where the user is lead through the experience by a professional sommelier. The experience is developed by using tactile and olfactory technologies, combined with visual and sound technologies, to simulate wine tasting experiences.

The aim of the application is to lead non-expert users in wine tasting, to be used as an advertisement tool, or to provide support for the remote sale of wines. Users can experience visual, tactile and olfactory characteristics of wines even in their absence. In order to achieve this result, the wine tasting experience and the role of the sensory modalities through which users typically enjoy this experience have been analysed.

The common actions during a wine tasting are to see, swirl, smell, sip and spit the wine. Specifically, firstly the wine is poured into the glass. So, the user lifts the glass and, depending on the type of wine, turns the glass to release the aromas present in the wine, and to analyse its colour. The best method to release the aromas of the wines is by tilting the wine glass with a 30 degrees angle and rotating it counter clockwise. Then, the user brings the glass to the nose to smell the aromas of the wine. When smelling, it is important that the user holds the wine glass directly under its nose and takes a deep breath in [8]. Finally, the user tastes the wine. In this process, all these actions correspond to many sensorial cues that contribute to the multisensory experience of wine tasting, which culminates in the wine taste.

With the aim of creating a multisensory system for the wine tasting simulation, authors defined the architecture of the system, in which devices for creating visual, tactile and olfactory stimuli into a univocal flow are integrated.

Firstly, the system is based on an interactive movie through which the user is guided into a tour. Indeed, through some videos, the user is asked to make some choices (such as the type of wine to taste), is provided with information about the wine, and its visual and olfactory characteristics and is asked to carry out some actions. Synchronised with the videos, several sensors and actuators are integrated into the system in order to simulate the multi-sensory experience, through tactile and olfactory stimuli. These sensors and actuators are connected and physically integrated in appropriate positions into a glass, which has been chosen as the interaction interface between the user and the system. Specifically, a proximity sensor has been integrated to measure the distance between the glass position and the table; a Linear Resonant Actuator (LRA) and a Micro Controller (TIDRV2605L) have been integrated for the tactile simulation; and two olfactory devices for the delivery of the wine aromas. All these sensors and actuators are controlled by an Arduino UNO Rev 3 board, which is connected to a computer (see Fig. 1).

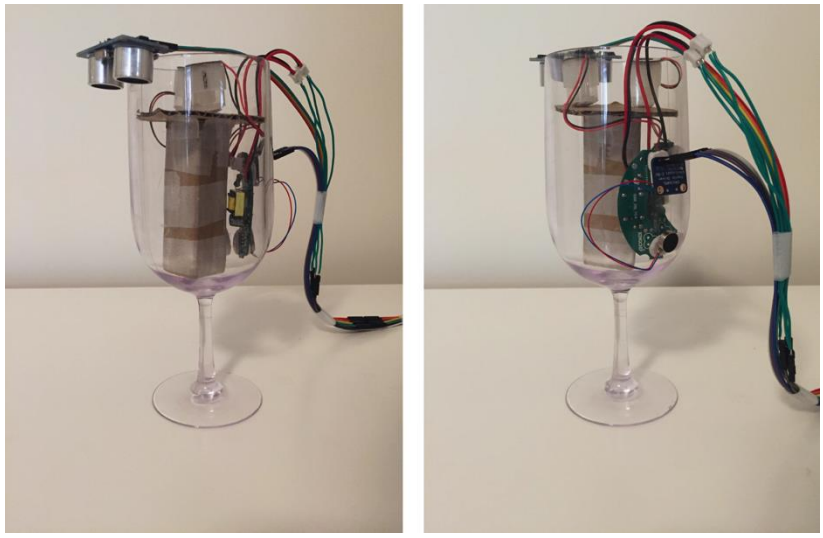

Fig. 1: The prototype of the glass containing sensors and actuators.

Concerning the interactive movie, it is divided in several videos. In the first video, a short introduction to the virtual wine tasting is given to the user, and he/she is asked to choose the typology

of wine to experiment (red or a white wine). This step allows to define the following phases of the experience based on the characteristics of the wine: choosing a white wine the characteristics that the user will experience will be consistent with this type of wine, and so will also be in the choice of a red wine (see Fig. 2). Consequently, a video specifically designed and developed for the wine typology starts. In this second video a sommelier explains the main characteristic of the wine and, at the end, asks the user to pick up the glass. At this point, the interaction between the user and the system is guided by the proximity sensor that allows detecting the distance between the glass and the table and, therefore, if the glass is lifted or not. When the user picks up the glass and the distance change, a third video starts. During the third video, the user is asked to rotate the glass in order to analyse the colour of the wine and to release its aromas. Through the Linear Resonant Actuator (LRA) and the Micro Controller (TIDRV2605L) for tactile simulation the user is able to perceive the movement of the wine inside the glass. Then, one of the two olfactory devices (one for the red wine and one for the white) produces the aromas, which are eventually smelled by the user. So, the user is able to see, swirl and smell the wine.

Fig. 2: The setup for the wine tasting experience.

Conclusions:

The correct combination of low-cost technologies for different senses can lead to the creation of very simple interactive experiences with a very relevant potential for marketing purposes. In this paper, we describe an application in which vision, hearing, tactile and olfactory technologies have been combined to create an interactive multisensory wine tasting experience. The result is a proof of concept that can be improved on different aspects to represent an even more realistic experience. The tactile component, for example, has a rather simplified rendering, compared to the complexity of tactile information coming from the simple handling of a full glass of a liquid. As for the olfactory part, the application can be improved by introducing additional types of odours. Finally, for the visual part, we can also use a head-mounted display to increase the level of immersion. Despite these limitations, even the current application has a considerable potential and in the future will be tested with users.

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