White Paper

sensory acumen

The Role of Olfactory Technology in Serious Gaming, Mental Training, and Therapy

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Introduction

Fundamentally, an olfactory feedback device is defined as a computer peripheral that in response to the user's application program, disperses odorants into the immediate surroundings of the user. Elevating the sophistication of an application program to that of serious gaming or virtual reality programming, an olfactory feedback device can play many useful roles in training, therapy, research and development, as well as in edutainment and entertainment. The key is to allow the participant to react interactively to olfactory stimuli.

How it works

Virtual realities are computer generated "worlds" that may include peripheral devices to augment the virtual experience. Software creates an environment scenario. Environments can be modeled after real life or created as an alternate reality, but the idea is to create something that the participant can relate to or recognize as a real experience. These software environments enable the user to have a sense of presence, hence being immersed. The peripherals generate stimuli, depending upon the virtual reality created, it may or may not want to allow outside stimuli. If so, the stimuli would need a controlled environment able to manage light, noise, scent, texture, and other things that the body is able to sense. This requires hardware, software, and stimuli. Peripherals and virtual processes may include tactile (keyboard and force feedback controller), olfactory (scent delivery systems and odor perception), visual (monitor and 3-D imagining), and auditory (speakers and spatial audio processing).

The olfactory feedback system has two modes of operations. In the first mode, utilizing the latest technologies in interactive programming, the olfactory feedback device disperses realistic aromatic sensations in response to specific program/gaming actions or situations. In each scenario, the type of scent to be dispersed can be pre-programmed by either the clinician or software developer. In the second mode, the type of scent to be dispersed can be programmed in real-time by the clinician, in response to conversation with the patient.

The terms virtual reality and game can be interchangeable in certain circumstances. From this point on, virtual reality will be referred to as game.

Serious Games
Games have evolved from the beginning of man using invented scenarios, objects, words, calculations, and can be for fun or for competitive purposes; to electronic games. Serious computer games are created for health, training, and therapy, and are not considered as consumer games for fun. Edutainment or educational games are also considered to be serious games, though they can be fun depending upon the opinion of the user. Many software developers concentrate on a certain game genre, but the quality of the game depends upon the development team and their strengths in game play, user interface, content, animation, programming, and interactivity,

Benefits of Using Olfactory Technology in Virtual Reality Serious Games
Serious games can enable assessment, reinforcement, real life authentic learning, retention of information, the improvement of concentration levels, the promotion of independent thinking, and for familiarity, among others. Veteran homelessness is a real issue for the Veterans Administration and can be combated by the use of serious games to assist veterans with acclimating back into civilian society and thus prevent the disenfranchisement of retired service men and women.

Example of Virtual Reality and Therapy
The University of Southern California's Institute for Creative Technologies developed a Virtual Reality program to treat service men and women suffering from Post Traumatic Stress Disorder (PTSD). Patients put on goggles and can enter, for instance, a "virtual Iraq". The virtual experience is heightened by the addition of sound and smell. Throughout the program session, a trained psychologist adjusts the visual and aural stimuli depending on the patient's reaction. Rather than ignoring traumatic memories, this program helps service members confront them head on in order to bring about recovery and resolution. The VR program was developed to treat veterans of the wars in Iraq and Afghanistan suffering from PTSD. The program interactively re-enacts actual combat conditions, taking the soldier through his or her ordeal at a pace where he or she can digest and understand what happened more readily. During the re-enactment, doctors manually open or close jars of scents (burnt rubber, residue from explosives, smoke from fires, etc.) for each situation as the program progresses. The concept of this program is not limited to PTSD; instead, it can also be used to treat those with autism, attention deficit disorder, and strokes.

Olfactory Technology
Scents and our personal experiences are only a couple of factors that influence the creation and recall of our memories and emotions. In everyday life, a person is exposed to the plethora of smells in their environments. In most cases involving gaming, a person is exposed to visual images and touch. Sensory Acumen, however, has developed GameSkunk, an olfactory technology system (scent delivery system) that will expose gamers to different scents, expanding the total gaming experience. GameSkunk v.1.1 is equipped with the delivery mechanism (to dispense the scent), multiple scent cartridges, and an API code that is incorporated in the game code.