INTRODUCTION

The project involves the building of a safe, user friendly, low-maintenance, and battery powered device for the Passion Works Studio Multi-sensory Stimulation Room that will stimulate the olfactory senses of disabled adults. Olfaction Satisfaction will emit scent upon input from a simple adaptive switch interface that is controlled by the user. Individuals with severe cognitive and motor disabilities find themselves in an environment that lacks stimulation of their senses. In response to this situation, Olfaction Satisfaction’s main purpose is to provide adequate stimulation of the individual’s senses. Activities such as watching television or playing video games are too complex for such individuals to enjoy. For this reason, simple interactive devices have been developed to stimulate the individual’s senses of touch, sight, and hearing. However, the sense of smell is largely ignored in these current devices and as a result the individual’s sense of smell is left without stimulation. Therefore, the purpose of Olfaction Satisfaction is to stimulate the olfactory senses in conjunction with the other senses of touch, sight, and hearing. This allows all of the individual’s senses to operate in conjunction with one another, providing the individual with adequate stimulation to facilitate cooperation among the senses. This provides a significant improvement in the quality of life of the client.

Figure 1: Olfaction Satisfaction

SUMMARY OF IMPACT

It must be emphasized that the disabled individuals require a device that is simple and easy to use. It is known that devices that are too complex to use have a tendency to frustrate or anger the disabled individuals. Olfaction Satisfaction was designed with the needs of the user in mind: Users can select from multiple scents by using two interchangeable switches; a large touch-pad and a squish switch. Ultimately the device serves to improve the client’s quality of life by promoting interaction with the environment and providing adequate stimulation of visual, auditory,
olfactory, and tactile senses. Furthermore, the client states that “It [Olfaction Satisfaction] will be a welcome addition to the studio because there is nothing else like it on the market today.”

TECHNICAL DISCRIPTION
Olfaction Satisfaction meets all of the client’s requirements. It provides a complete olfactory stimulation experience for the user. The user interface is simple and easy to use, so that frustration does not result when the user interacts with the device. Furthermore, a versatile interface consisting of interchangeable switches connected via ¼ inch stereo jacks ensures that the device can be used by any user regardless motor skill or disability.

Furthermore, Olfaction Satisfaction is durable enough to withstand rough handling and mistreatment as the base and device casing is constructed out of 0.125” Gray PVC sheeting. The smooth exterior of the design also provides for the user’s safety, making Olfaction Satisfaction able to be used without risk of injury. This fact, combined with the easy to use interface, makes the device able to be used with little to no supervision required.

A lever system was incorporated with a 12 Volt Solenoid to provide the force necessary to release fragrances from the aerosol cans contain in the fragrance chamber. The removable aerosol cans of the fragrance chamber make the device easy to clean and allows for installation of new fragrances in the device. This allows Olfaction Satisfaction to stimulate with a wide variety of scents and odors, giving the device the ability to offer a constantly changing and engaging sensory experience.

A PIC16F874 Microcontroller is responsible for taking input from the switches and processing them into output that controls activation of the various sound chips, LED’s, and solenoids of Olfaction Satisfaction. In this regard, the PIC Microcontroller is the ‘brain’ of Olfaction Satisfaction. A control circuit containing the PIC, Solenoid Drivers, 7405 Hex Inverter Chips, Voltage Regulators, and other components enable the PIC Microcontroller to control every component of Olfaction Satisfaction directly. Pull-up resistors make interactions with the user interface seen as a binary pattern of high (+5 Volts) or low (~0 Volts) voltages at the input terminals of the PIC Microcontroller. In response to a specific input pattern from the switches the device will: 1) Indicate currently selected fragrance and wait for input from user, 2) Change currently selected fragrance and play a sound, or 3) Release fragrance, play sounds, display LED visual stimulation pattern.

Insert Photo 2   Note: Final Picture dimensions are: height = 3.5", width = 4.5"

Figure 2: Main Circuit

The cost of parts and material for the device was approximately $660.00.