MIST
A Musical Interactive Space for Therapy

INSTRUCTION MANUAL

1.0 GENERAL INFORMATION

1.1 System Overview

The software runs on Mac requires 2 GB RAM and 500 MB of available disc space. A Microsoft Kinect and power adapter is required. The system requires Synapse.app, an open-source software that extracts data from the Kinect. Synapse can be downloaded from synapsekinect.tumblr.com. Follow the instructions given on the site to install.

1.2 Installation

Review the system requirements as listed in the System Overview. Make sure your system meets the minimum requirements, then proceed.

Synapse

First, go to synapsekinect.tumblr.com, click on downloads, and download Synapse.app for your operating system. Drag the "synapse" folder to your Applications folder. Inside the "synapse" folder is an item labeled "Synapse.app." Plug your Kinect into the computer and the wall, and double click on this item. You're good to go!

MIST

Open the zip file and extract all files. Save the file folder MIST to the Applications folder on your computer. Inside this folder are several items. One is called "MIST.app." This is the program; double-click on it and you're good to go. Make sure you don't move anything originally in the MIST folder out, or it will not work.

1.3 Hardware Setup

In an open space at least 8ft by 8 ft and no larger than 20ft by 20ft, set up the Kinect on a shelf, table, or mount and face it towards the open space. For best results, the Kinect should be about 6ft high and pointing down into the space. Plug it into a wall outlet and set your computer on a stable, flat surface no more than 6ft away from the wall outlet or the Kinect (length of the cable). Plug the

powerUSB connector into the port on the opposite end of the power cable. Then plug the regular USB cable from the power cable into your computer. Launch Synapse and preview the visible space of the Kinect in the Synapse green viewer window. Adjust the Kinect as necessary. Avoid manually adjusting the tilt of the Kinect as much as possible; it is not meant for this type of manual adjustment.

2.0 USING THE SYSTEM

2.1 Modes of Interaction

MODE	THERAPEUTIC GOAL	THEORY	INTERACTION	MUSICAL RESPONSE
Reach	Upper extremity extension, muscle strength and control	Patterned Sensory Enhancement	Reach arms vertically above head, then extend them out from the body and down	"Bouncing" upward sounds, success sounds, timer sound, and "magic" sound painting
Balance	Proprioception, spatial awareness, muscle strength, control and coordination	Patterned Sensory Enhancement Play Therapy	Lean from side to side in a rhythmic manner; lean from side to side and hold on each side	Rhythmic loops based in Latin percussion and tribal drums
PlaySpace	Proprioception, spatial awareness, upper extremity extension, muscle strength, auditory discrimination, musical expression, facilitated play	Immersive Sonic Environments Play Therapy Pendaphonics	Explore by moving within the space to discover sound areas and interactions within them (waving/extending of arms, bending/ standing, dancing, etc.)	Two soundworlds: a forest that includes birds, frogs, drums, bells and chimes; and an ocean that includes splashing, bubbles, whales, and seagulls

2.2 Modes Setup

Set up the system hardware as described above. Make sure the Kinect is plugged via USB into your computer, and into the wall as described in Hardware Set-Up. Launch Synapse.app on your computer. A window called Synapse with a green camera view of your space should appear. Verify that the space the Kinect sees is the active space of the room, i.e., that it is not angled too low or high and faces the center of the room. Then, launch MIST.app.

To begin, select the mode you want to use. Then, take this time to set the required settings:

- In REACH mode, no required settings.
- In BALANCE mode, functional mode, size, speed and rhythm are required.
- In PLAYSPACE mode, Soundworld is required.

Others listed are optional; the system will run without changing these settings.

2.2 Functionality of Modes

When all of the settings are defined, press the blue ON button to begin. The subject can already be in the space, or can enter the space now. The subject must say hello to the room by lifting his/her hands into a tree pose for 3 seconds. The upper arms must be parallel to the ground and the forearms must be lifted vertically. System will recognize the subject sitting or standing while facing the Kinect, though the body from pelvis to tips of fingers must be visible in the Kinect's line of sight. When the body is recognized, an ascending chime sound will play and the box marked "body found" will fill with a blue X. The function has now begun.

2.2.1 Reach mode

The intention of this mode is to provide real time audio feedback to the client about how their current physical movements relate to a specific goal movement that highlights upper extremity extension. For example, if their motion is not fully extended throughout, the volume of the sound output is lessened. The therapist should demonstrate the intended motion for them while playing a recording of the correct sounds, then the client will attempt the movement while in the system.

As the hand(s) reach up, they trigger ascending sounds that encourage further upward motion. When the hand(s) reach the vertical extension goal, a success tone is played and a pentatonic scale of pan flute tones begin to play, such that the notes of the scale are all heard within the given time (in seconds) specified by the therapist. This gives audio feedback that the hands need to stay in place until the scale is finished.

If the hands fall below the height call, the pan flute scale stops and the client needs to start the task over. If the hand is held at the given height goal for the specified amount of time, the hands are given "instruments," meaning that the speed and location of the hands in space suddenly cause musical output of bell-like sounds, much like the hands are painting in music. As this musical output takes place, the system is looking for an extended motion out to a horizontal extension goal. The client has five seconds to reach this horizontal extension. If it is reached within the five seconds, a congratulatory tone is played. If it is not reached, the instruments fade and the client can start the task again.

2.2.2 Balance Mode

There are two similar balance modes to demonstrate. The goal of both is to work on muscle tone, awareness of body position, timing, and symmetry of motion on both sides. In both modes, the client sways back and forth, looking for given horizontal goals. The therapist can choose the size and tempo of the lean the client must execute. Also, the client can sit or in the space to work on the lean. There are three rhythmic loops to choose from and each of these can play in five tempos. The therapist can control which loop and how fast it is playing with the <</>> and +/– buttons, respectively.

In the first mode, "Rhythm," as the torso reaches the set goal, one bar of a rhythmic loop is played and then stops. They must reach their torso to their other side goal to trigger another bar of the loop. If they lean back and forth at the exact right tempo, the rhythm is maintained. If they reach too early, the loop sounds choppy as it restarts too soon. If they are too slow, there is a break in the sound.

In the second mode, "Rhythm Hold," as long as the client's torso stays far enough past the given horizontal goal, the rhythm keeps looping. The client can hold for as long as they wish and then sway to the other size. The holding mode is to increase core strength.

2.2.3 PlaySpace mode

The PlaySpace is an interactive space approximately 15ft x 15ft in area. The sound reacts to movement within the space in direct but not immediately obvious ways. The music occurs in response to various movements of the body, including spatial location and amount of motion. The PlaySpace is meant to encourage exploration of space and the body, musical expression, play, and social interaction.

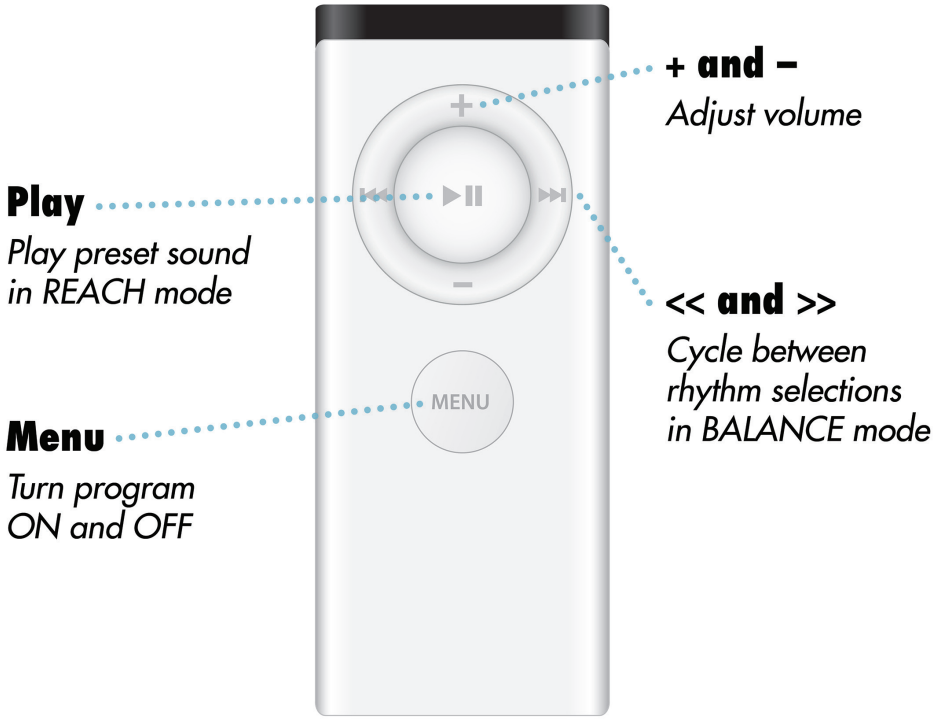
There are currently two sound environments that are functional, with plans for a third. The first is an Enchanted Forest, and the second is Underwater. Each sound environment follows the same basic structure. There is a base soundscape track that constantly loops as long as the space is turned on. There are three sound areas that have specific interactions within them. Both current worlds have a bird area, in which many birds can be heard and shaking the left and/or right hands makes even more birds fly. The underwater world birds are seagulls, and are also accompanied by the sound of waves hitting the shore, as if you've ascended to the surface of the ocean.

The second sound area in each sound environment is a moveable area, meaning that when the subject finds the sound, they can pick it up and move it to another area in the space. In the forest, the sound is frogs, and underwater, it's bubbles. To pick up this sound, the client must put his/her hands near the ground and then move them back up to the torso. A notifying chime tone is played, and the sound (bubbles and frogs) gets noticeably louder until it is placed down again wherever in the space the client chooses. To place the sound down, the client must put the hands near the floor again, When the sound is placed down, another notifying tone will be played.

The last area is drumming elves in the forest and singing whales in underwater. The system looks for overall motion of the body and adds layers of rhythm to the elves' drumming the more you move. Therefore, dancing, or overall body movement is a good way to trigger these drum sounds. In Underwater, the overall amount of hand motion causes more whales to start singing. Distance of the hands from the body causes the whale song to get louder. Each of these areas contains an incentive sound; if you remain in the elves or whale area long enough (default 20 seconds), excerpts of fitting Disney songs begin to play.

There is also one main interaction for when the subject is not in one of the three sound areas; in the underwater world, hand movement is tracked constantly and outputs a sound of hands rushing through water as if the subject is swimming underwater. The forest world is similar, except the resulting sound is of midi instruments (tubular bells and music box) and is meant to feel like a musical magic wand. The pitch goes higher as the hand goes higher, and the sound strikes are related to speed of the hand. The wand only appears if the hand reaches far enough away from the body center. The wand then disappears if the overall speed of hand motion falls below a certain level.

APPLE CONTROLLER



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Synapse is an external open-source cross platform application that performs all of the data analysis from the Kinect, and was developed by Ryan Challinor, a Harmonix Music Systems programmer. More information about him and the Synapse project can be found at synapsekinect.tumblr.com. The MaxMSP code, interaction design, and sound design for Kinect Music Games was done by Kimberlee Headlee. The user interface was designed by Shawn Swisher.

Sounds were created from sounds owned by the school or Arts, Media and Engineering, personal recordings by the author, and creative commons license submissions from Freesound.org by the following artists/users: ben_jamin0, Robinhood76, digifishmusic, inchadney, atomwrath, plotzki, sandyrb, kwazi, acclivity, kijjaz, and ScottMan. For a full list of files, please see http://kimheadlee.blogspot.com/2011/11/mist-freesoundorg-attribution.html