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## ABSTRACT

This literature review will research the decision making/support systems and prioritization processes from a number of sources including books from a reputable source, academic and trade journals.

## GENERAL TERMS

Experimentation.

## KEYWORDS

DJ, Leap Motion, Virtual DJ.

## 1. INTRODUCTION

DJ (Disc Jockey) has been a hobby and profession all over the world for many years. Technology is continuously advancing, and the DJ environment is evolving and advancing with it.

Leap motion has given us the opportunity to replace the mouse and keyboard with natural hand movements, we plan to take this one step further and replace the DJ’s mixing deck, the hand movements and gestures will be much the same. Combining the already successful Virtual DJ system with the Leap Motion Intuitive 3D software to accomplish this.

## 2. RELATED WORK

### 2.1 LEAP MOTION

Because Leap Motions software is so new people don’t have access to them, unless they become a developer, and they aren’t in stores until the 19th May 2013 there is minimal projects in the same field. There are however videos on YouTube of it being used to replace [4,7,8,9]musical instrument such as the harp, piano and guitar.

### 2.2 ACCLE GLOVE

A similar technology to capture hand motion is the Accele Glove which captures hand gestures in virtual reality.[10]

### 2.3 THERMIN

The only other musical hand motion device is the Theremin which was invented in 1919 by a Russian physicist named Lev Termen.[12]

### 2.4 VIRTUAL MUSICAL INSTUMENTS

The possibility of learning and creating music by playing musical instruments using a computer keyboard and mouse control as the interface. [11]

### 2.5 VIRTUAL DJ

Software that allows DJs to go digital, using a computer instead of CDs. The software keeps the original CD Jays structure allowing the user to cue and mix music, but with extra features like, creating a playlist, recording and saving snippets of songs to overlay or loop. Virtual DJ also has downloadable scripts that can be added to the software allowing the user to change the skin (user interface) and add new effects.

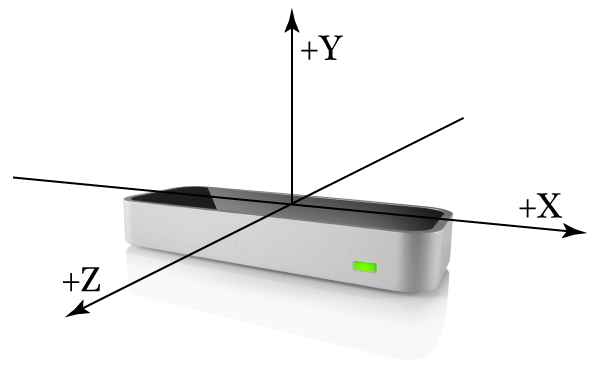
## 3. SYSTEM OVERVIEW

The framework of our system is as follows:

1. Detection/Tracking. Tracking the width, height and depth of the hand to associate it with Virtual DJs map.
2. Data mapping. Map the different hand movements and have the software know the precise amount of a movement.
3. Motion. Associate the rotate motion built into the Leap device to adjust the treble, mid, bass and volume with pin point accuracy.
4. Check to see if user is Swiping, pushing, twisting
5. Detect and read the fingers is being used
6. Detect where the hand and fingers resides it is in relation to the software
7. Find individual X,Y and Z locations for fingers
8. Call scripts related to hand motions
9. Decide what scripts to call based on X,Y,Z locations
10. Find and call a script based on locations and gestures used
11. Send scripts to software to be used

### 3.1 MOTION DETECTION/TRACKING

Leap Motion Detects the hand and figure movements using X, Y and Z co-ordinates, we will have to track these movements to associate with the Virtual DJ software.



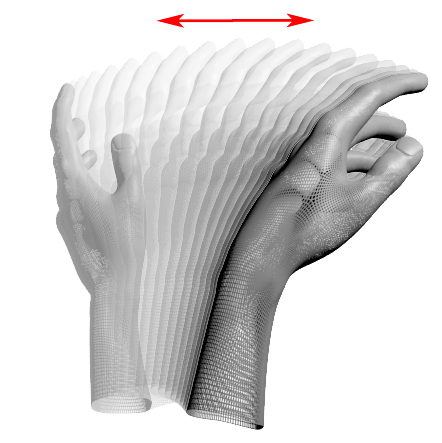
##### Figure 1: The Leap co-ordinate system.

### 3.2 DATA MAPPING

Leap Motions SDK currently maps your hand movements inside their app. We will use these motions on top of the Virtual DJ software to mimic an external turntable. The X, Y and Z co-ordinates of the users hands will have to be mapped so when they move the hand to turn up the volume it doesn’t register it as a swipe gesture and call the method associated with the swipe motion at those co-ordinates.

### 3.3 MOTION GESTURE

Detecting what way the hand is going and exactly how far is key to creating and mixing music successfully. Using the Leap Motions wide range of built movements it can already pick up, we will be able to create a virtual environment where the DJ doesn’t loose the effect of touch.



##### Figure2. A horizontal swipe gesture



##### Figure3. Finger tip position and direction vectors provide the positions of the fingertips and the directions in which the fingers are pointing.

## 4. CONCLUSION

In conclusion we will be creating a script that allows the leap motion device to work on top of the Virtual DJ software. We aim to combine the two separate software’s to allow the users to DJ in a more free environment by removing the mixing deck and having a virtual one that doesn’t remove the touch and feel senses that a DJ need to mix and create music. With the Leap Motion device currently costing $69.99 dollars [7], appose to a mixing deck costing upwards of $400 [1] dollars, our software will make becoming a DJ more accessible to more people.

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