# InteractivePrototype-Group:Elephants

## From CS160: User Interface Design Sp12

## Contents



## Each team member's name and role in this assignment

- Elena Gasparini - contributed to planning and creating the interactive prototype, contributed to writeup
- Danube Phan - contributed to implementing interactive prototype, screenshots, and write-up
- Rohan Ramakrishnan - wrote the code for the menu system, contributed to writeup, helped edit video
- Timothy Zhu - contributed to writeup screenshots, integrated menu and app
- Danny Tan - contributed to planning and creating the interactive prototype, helped create video, created presentation, contributed to writeup

## Problem and solution overview

**Problem:** Ballroom dancing essentially requires the dancer to have a partner/teacher to show them what they're doing wrong and how to fix it, making it very difficult for the dancer to practice moves if they are by themselves (i.e. at home). This can be an issue if the user does not know many ballroom dancers, cannot attend classes for whatever reason, or simply wants more practice on their own.

**Solution:** Make a Kinect app that allows people to get a similar kind of feedback as they would normally get from a dance instructor/partner, allowing them to practice their dance moves and learn new ones by themselves.

## Tasks

**EASY - Learn standard ballroom frame/posture (i.e. how you are supposed to look when dancing)** In this task the user follows instruction from an instructional video while receiving text feedback about their body positioning in order to practice and improve their standard ballroom posture, a static position. Feedback includes messages such as "Raise your right elbow" and "Remember to stand up straight" depending on the positioning of the user.

**MODERATE - Learn a basic stationary (non-traveling) dance figure (Closed Change figure in Waltz)** Our moderate task involves dance the closed change figure in Waltz, which requires keeping posture while moving. In this task the user's feet positions are displayed on the screen such that when the user's feet move forward the image of the user's feet move up higher in the y direction. In this way the user can see what their feet are doing as they move around. Arrows appear by the user's feet and disappear as the user performs the correct corresponding motion. Our moderate task includes only 3 steps for the user to follow.

**DIFFICULT - Learn a dance sequence (Cha-cha New Yorker)** Our difficult task is dancing a Cha-cha New Yorker sequence. The sequence is more difficult than a single figure, as in the moderate task, because it involves dancing multiple dance figures back-to-back, including a turn. As in the moderate task, the user's feet are displayed and the user follows direction from arrows which appear near the images of the user's feet.

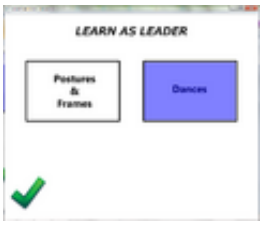
## Revised interface design

### Changes

Menu:

- Eliminated the back button, instead using "back" gesture to lessen user motion trying to select button


Before




After

- Included a checkmark to indicate to the user that the application is ready to track the user so that the user knows what is wrong when the menu is being unresponsive.


Easy Task (Posture/Frame):

- Color video of the user to the left instead of using the whole screen for video of the user for better organization. This color video is only the center of the video to focus on the user because the user is not moving very much while practicing posture.

Before

After

- We are no longer using an overlaid skeleton of the correct posture/frame that the user should conform to. The skeleton was unnecessary for the user and instead we will just use the color video of the user and provide adequate feedback (described below) for the user to improve posture/frame.

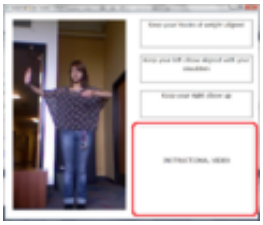
Before

After

- Instead of a single feedback box at the top of the screen, we use 3 feedback boxes in the upper right corner. The top box has feedback for good posture: keeping the spine straight, keeping the knees and feet together. The middle box has feedback for positioning the left arm: keeping the left hand at eye level, extending the left arm further, and keeping the left elbow aligned with the shoulders. The bottom box has feedback for positioning the right arm: making sure right elbow is in front of you, bringing your right hand out further, keeping your right hand at chest level, and keeping your right elbow up. This would allow more adequate feedback in order to know how to improve and allow the user freedom to do task as long as they feel is necessary. Dancing also requires coordination of multiple parts of the body so feedback on multiple parts of the body allows for improved coordination.

| | |
|---|---|
|  |  |
| Before | After |

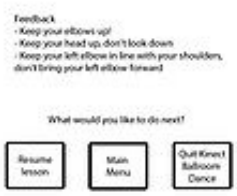
- Instructional video will be in lower right corner for the user to follow along. (No change)

| | |
|---|---|
|  |  |
| Before | After |

- Eliminated pause button and replaced with pause gesture (hands above head) for better organization of layout and for less movement by user to navigate to button and select. Upon pausing or completing task, pause/feedback screen should show up with options to resume lesson, go back to main menu, or quit Kinect Ballroom Dance.

Before

After: Easy Task without Pause Button




Pause/Feedback screen after pausing/completing easy task

Medium/Hard Task (Closed Change, Cha-Cha New Yorker):

- Instead of using arrows on the color video of the user to direct the user in how to perform the dance steps, we chose visual feedback of tracking the user's feet positions and usage of directional arrows on the feet positions in order to instruct the user with how to perform the dance steps. This allows for better visual feedback for what the user should be doing and for better organization of the layout.

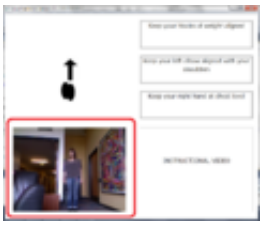
Before

After

- Instead of using one feedback box at the top of the screen, we will use 3 feedback boxes in the upper right corner. The top box displays feedback for keeping your blocks of weight aligned (or spine straight). The middle box displays feedback for foot direction (e.g. Move your left foot right, etc.). The bottom box displays other feedback and encouragement on their progress. This would allow more adequate feedback in order to know how to improve and allow the user freedom to focus on one aspect and do a task as long as they feel is necessary.

| | |
|---|---|
|  |  |
| Before | After |

- Color video of the user in the lower left corner instead of using the entire screen for the user for better organization of visual display.

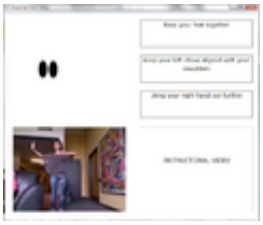
| | |
|---|---|
|  |  |
| Before | After |

- We originally had it so that when the user selected "Dances" from a menu, it would play the instructional video on default. But instead, we put the instructional video in the lower right corner of the screen by default; this would allow the user to dance along with the video and get feedback at the same time.

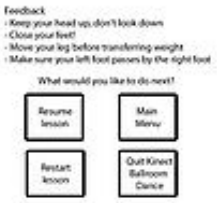
| | |
|---|---|
|  |  |
| Before | After |

- Eliminated the pause button from interactive screens to be replaced with a pause gesture (hands above head) for better organization and for less movement by user to navigate to button and select. For medium/hard task, the options are the same as the easy task's options with an additional option to restart the lesson.

Before



After: Medium/Hard Task without Pause Button



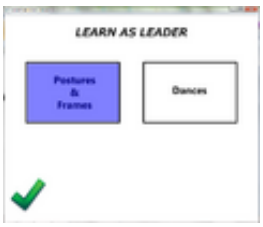

Pause/Feedback after pausing/completing medium/hard task

**Storyboard of Tasks**

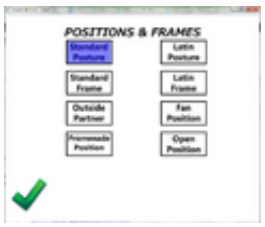
Assuming the user has used the Kinect Ballroom Dance application and that the user is familiar with the gestures necessary to navigate our application's menu as well as the dance terminology used, the user should be able to perform the following three tasks.

- Easy Task (Standard Ballroom Posture/Frame for Leader):


At the welcome screen, the user should select Learn as a Leader.



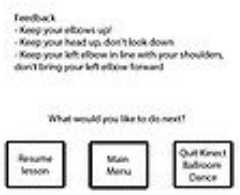

The user should select Posture/Frame.




The user should select Standard Posture.

User should see color video of themselves. Feedback should show in each of the 3 boxes in the upper right corner to allow the user to improve their posture. Instructional video should be displayed in lower right

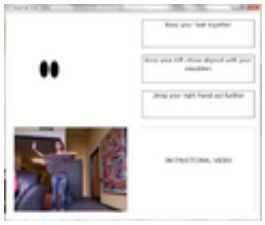
corner.




When user decides to end the task with appropriate gesture (hands above head), feedback screen should be displayed.

Task should not finish automatically. The user can choose to end it by performing a gesture (e.g. putting hands above head).

- Medium Task (Closed Change figure in Waltz for Leader):




At the welcome screen, user should select Learn as a Leader.

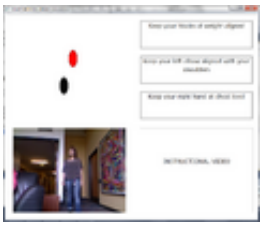

User should select Dances.


User should select Closed Change.

Tracking the user's feet positions should begin automatically in top left corner. Feedback should be displayed in each of the 3 boxes in the upper right corner to allow the user to improve their dancing and posture throughout the entire dance figure. Instructional video should play automatically. User should see a color video

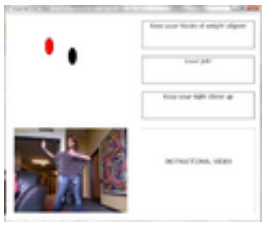
of themselves.

First dance step is moving the right foot forward.



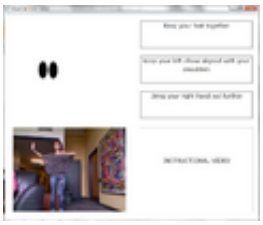
After user steps forward, up arrow should disappear. Right foot will highlight red to indicate that the user should put weight on their right foot.

After user puts weight on right foot, red highlight disappears. Second dance step is to move the left foot in the direction of the curved arrow.



After user moves left foot to direction of arrow, curved arrow disappears, left foot highlights red to indicate user needs to put weight on left foot.

After user puts weight on left foot, left arrow should appear for the right foot to join the left foot.

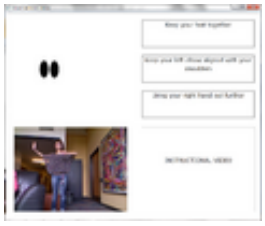


Completed closed change!

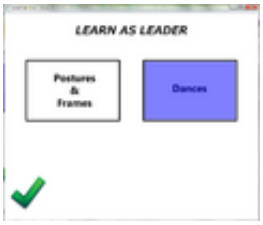

When completed, feedback screen should be displayed.

Task should stop after doing one complete closed change.

- Hard Task (Cha-Cha New Yorker sequence):



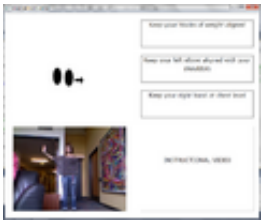

At the welcome screen, user should select Learn as a Leader.



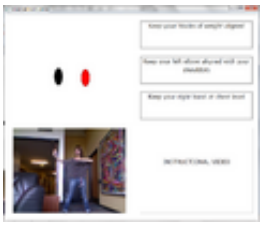

User should select Dances.


User should select Cha-Cha New Yorker.

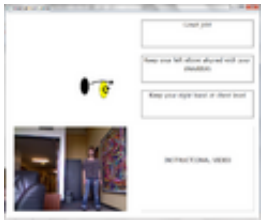
Tracking the user's feet positions should begin automatically in top left corner. Feedback should be displayed in each of the 3 boxes in the upper right corner to allow the user to improve their dancing and posture throughout the entire dance figure. Instructional video should play automatically. User should see a color video of themselves.



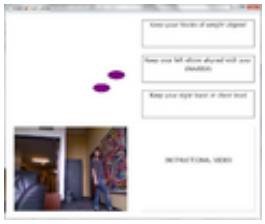
Similar to medium task, arrows/red highlights should appear as indication of where the user should move their feet and which foot to place weight on.



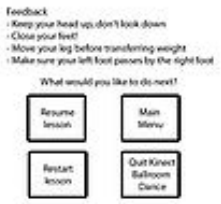
Red highlight of foot.



Eventually user will get to a dance step where the foot must be turned. We have indicated this using a directional circular arrow.



The displayed feet positions should turn in that direction after. Purple indicates splitting weight evenly on each foot.




When completed, feedback screen should be displayed.

Task should stop after doing one complete Cha-Cha New Yorker sequence.

## Prototype overview

### Overview of the implemented UI

**Menu** (See Images below) We have a menu similar to our prototype. Our menu uses a "snap-to" cursor rather than a hovering cursor; that is, the cursor automatically snaps to one of the menu options. Moving the cursor is controlled by the right hand; the user selects an option by raising their left hand to just below their head, and goes backwards in the menu by lifting their left hand above their head and holding it there. In the bottom left-hand corner, there is an indicator whether or not the Kinect can see the user: If the Kinect cannot see the user, the indicator shows a red circle with a slash through it (aka the "no symbol" (http://en.wikipedia.org/wiki/No_sign|) ), and if it can see the user it shows a green checkmark.

**Posture Lesson** (See Image below) The display for teaching the user a posture includes the video feed of the user, an instructional video, and textual feedback.

- **Color Video Feed** It is important for a user to be able to see herself while she is practicing her dancing. Ballroom dancers often practice in front of a mirror. This is very important for dancers because it allows them to see how they look performing the dance and better correct things that don't look quite right. The color video feed is larger in a posture lesson than it is in a dance lesson because in a dance lesson users are meant to focus more on learning the steps. This program is for beginners, so we first emphasize the basics.
- **Feedback** In the feedback section, textual feedback is given about body placement. Messages with useful information as to how the user can improve her posture appear in the feedback boxes. Examples of such messages include "Extend your left arm further" and "bring your knees closer together." When all 3 boxes display an encouraging message like "Great job!" the user knows that they are doing well and the Kinect does not find anything that needs to be improved in terms of posture.
- **Instructional Video** The Instructional video (not implemented yet) plays while the user is attempting the posture. The person in the video demonstrates and explains the posture in order to make it easier for the user to understand what she is meant to be doing. The video provides guidance while the feedback boxes provide feedback about the user's performance. In this way, the user has a good experience learning what she is meant to be doing in the first place as well as feedback. The instructional video is important because dancers need a teacher to explain and demonstrate the postures. The instructional video fulfills this purpose.

**Dance Lesson** (See Image below) The dance lesson display includes real-time map of the users feet onto a 2D display, a color video of the user so that she can see herself, an instructional video which explains and demonstrates the steps that the user ought to be taking, and boxes with information about what steps to take next as well as feedback about posture.

- **Feet** The user's main focus will be on the display of her feet, because this shows arrows which she needs to follow in order to move to the next step. The arrows appear one step at a time and disappear when the user has made the correct movement with her feet. When a foot colors red this means that the user needs to put her weight onto that foot. An arrow or a coloring will occur as a single step unless two motions need to be done simultaneously. For example, if the user needs to move her right foot forward, an arrow will appear above the right foot on the display. As the user mover her foot forward, the display image of her foot moves up along the arrow. When the user has moved her foot

forward so that the display foot has traveled along the arrow to the end of the arrow, the arrow will disappear and the next one will appear. Occasionally, instead of an arrow one of the two feet will show a red coloring. This signifies to the user that in this step of the dance the user needs to switch body weight onto the indicated foot.

- **Color Video Feed** It is important for a user to be able to see herself while she is practicing her dancing. Ballroom dancers often practice in front of a mirror. This is very important for dancers because it allows them to see how they look performing the dance and better correct things that don't look quite right. The color video feed is larger in a posture lesson than it is in a dance lesson because in a dance lesson users are meant to focus more on learning the steps. This program is for beginners, so we first emphasize the basics.
- **Feedback** In the feedback section, the first box of feedback includes information about how to best perform the action indicated by arrows or coloring in the feet view section. The next two boxes include information about the users form and dance performance.
- **Instructional Video** We have not yet added the instructional videos to our project, but this will be a video of someone doing the move and explaining the steps. We will have it pause at certain positions until the user has completed the step and then it will continue. For example, the arrows appears above the user's right foot, indicating that she needs to move her foot forward. At this point, the instructional video will begin to play. It will say, "step forward like this" and show someone demonstrating the move. Then it will pause. Once the user has stepped forward with her right foot, the arrow will disappear and the next one will appear. At this point the instructional video will play again and explain and demonstrate the next move that is indicated by the arrow. We believe that an instructional video is important because when ballroom dancers learn they are often receiving guidance and instruction by others. The instructional video makes Kinect Ballroom Dance more relate-able and easy to use by showing a video of a real person explaining the postures and dance moves.

**What was left out and why**

We used to have a pause button on the displays for posture and movement teaching, but we abandoned it in favor of a motion which the user could perform (holding their hands above their head) which would signal the application to take them to an options page.

We used to have a Back button for the Menus, but chose to use a gesture for navigating back in order to minimize user movement in trying to select the Back button and then using the gesture to select a button.

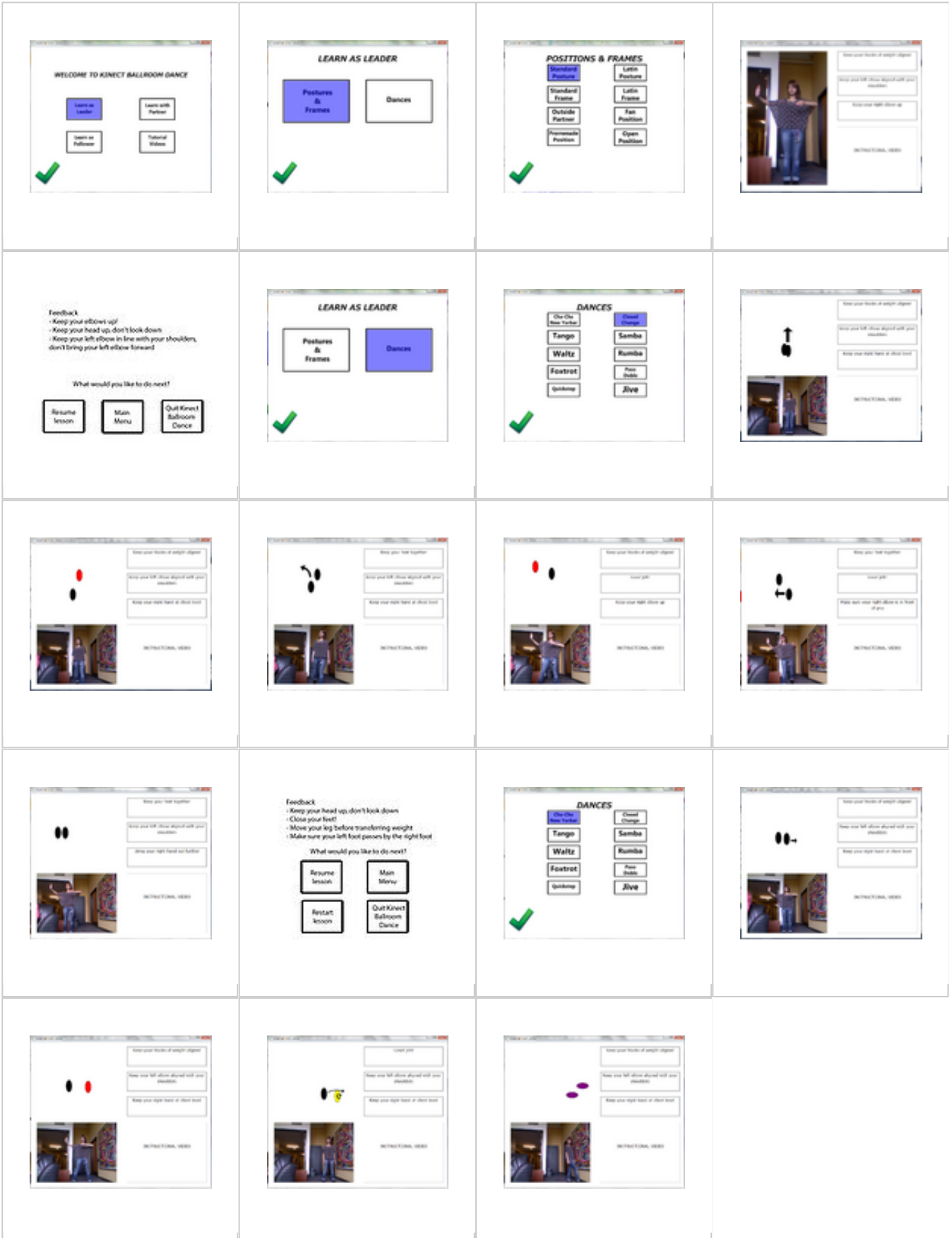
**Any Wizard of Oz techniques that are required to make it work**

Our only Wizard of Oz technique is the final feedback given at the end of the tasks and on the pause screen. Whenever the user makes the motion to pause or stop (hands above head) he is taken to a screen that allows him options to resume, go back to the menu, quit, or restart the lesson. This page also gives information on how he has been doing so far. This feedback on how he is doing so far is overall feedback based on how he has been performing throughout that particular lesson. It would be very difficult to implement and is not necessary for this version of our prototype. Unlike our other feedback which is displayed on the screen and is not done as a Wizard of Oz, the pause and final feedback accounts for the users performance throughout multiple steps of a dance. The comprehensive feedback is not part of our easy, moderate, or hard tasks and is not central or essential to out application.

**Documentation of any code not written by the team (libraries used, etc.)**

All code from Microsoft involving KinectSDKv1, KinectColorViewer, KinectSensorChooser. This code was used to access Kinect functionality and not the focus of our project.

## Prototype screenshots



## Source Code

Here is our source code: File:KinectBallroomDance.zip

## Video

Here is our prototype video: File:KinectBallroomDance.wmv

## Presentation Slides

Here are the slides for our presentation: File:KinectBallroomDancePresentationApril9.pdf

---