



LET'S  
DANCE

## Low-Fi Prototype Report

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### Introduction

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**Mission Statement:**

Effortlessly create, visualize, and share dance formations.

**Solution Overview:**

Visualizing formation changes and blocking is a difficult task for choreographers. Our application allows choreographers to create, record, and share formations, as well as see their creation in physical space.

## Sketches

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### Concept Sketches

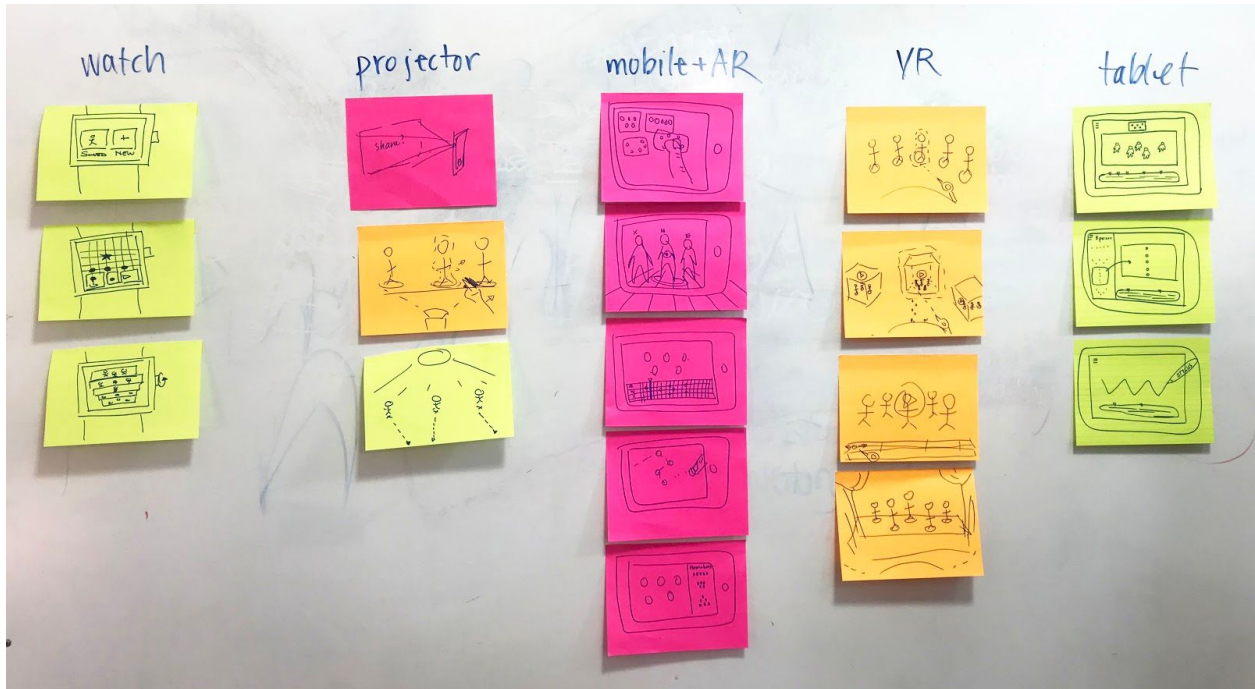


Figure I. Concept sketches for smart watch, projector, mobile and AR, VR, and tablet interfaces

## UI Sketches

Our first interface design (see Figure 2) features a mobile AR interface that allows the user to create formations in a 2D interface with overviews of keyframes, view and edit formations within physical space, share keyframes, and playback formations with a music progress bar.



Figure 2. Mobile AR focused sketch

Our second interface design (see Figure 3) accomplishes similar tasks, but takes advantage of more screen space to display dual front and top views of dance formations. Stylus input also allows users to draw in lines for formations.

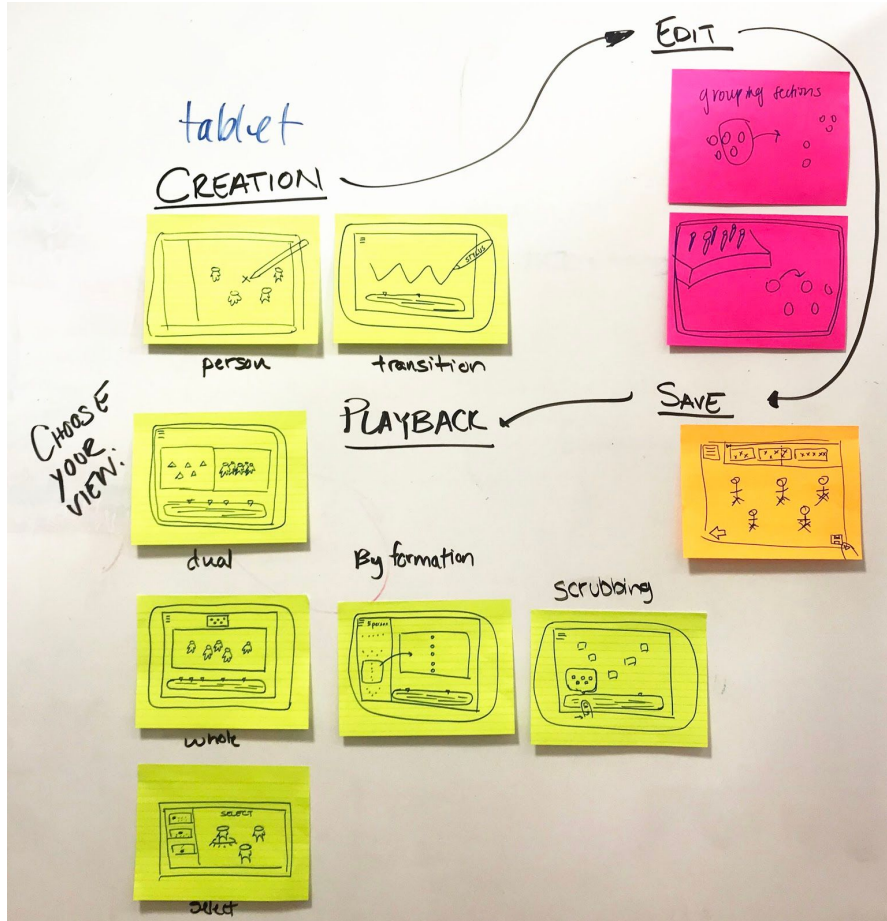


Figure 3. Tablet interaction sketch

After weighing pros and cons of the two interfaces, we decided to follow through with a mobile+AR interaction for its accessibility to our user group of choreographers.

Mobile + AR		Tablet	
Pros	Cons	Pros	Cons
<ul style="list-style-type: none"> <li>- Everyone has one</li> <li>- Can share over text</li> <li>- Better cameras</li> <li>- Simpler UIs</li> </ul>	<ul style="list-style-type: none"> <li>- Small screen</li> <li>- Can't do multiple views at same size</li> </ul>	<ul style="list-style-type: none"> <li>- Stylus (intuitive way to interact; already use pen and paper)</li> <li>- Larger screen space</li> </ul>	<ul style="list-style-type: none"> <li>- Need data plan to share over text</li> <li>- Not as common</li> </ul>

## Selected Interface Design



Figure 3. Brainstorming task flows for 4 basic tasks. Basic features are noted on paper and various layouts of these features are experimented with.

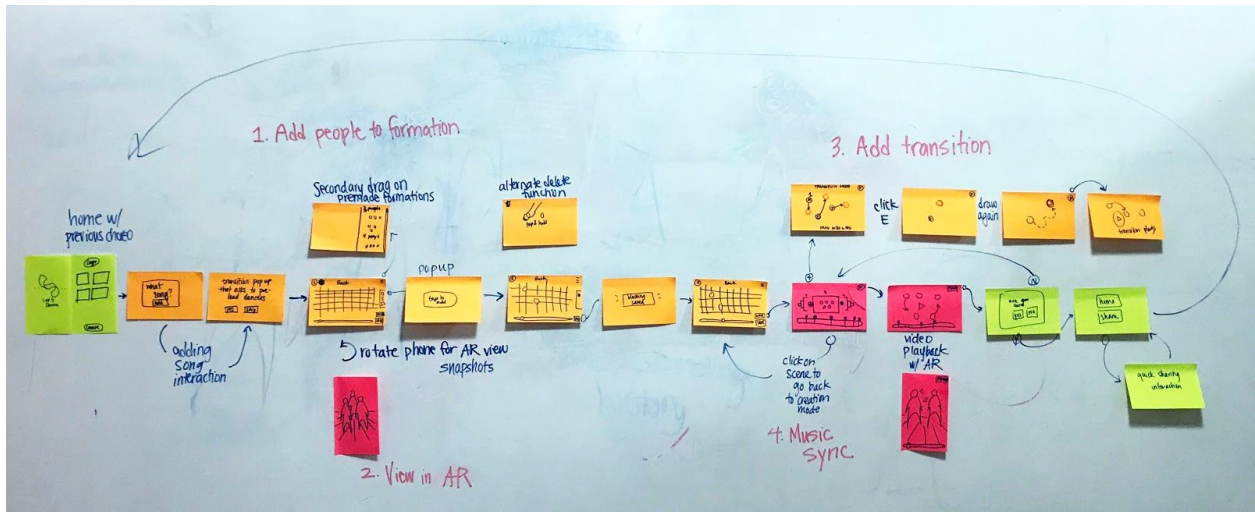


Figure 4. Final selected interface. Close up snapshots of this image can be found in the appendix.

## Prototype

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We split our prototype into the three tasks: 1) adding people to and saving formations 2) adding transitions between formations, and 3) moving formations to different times in the music.

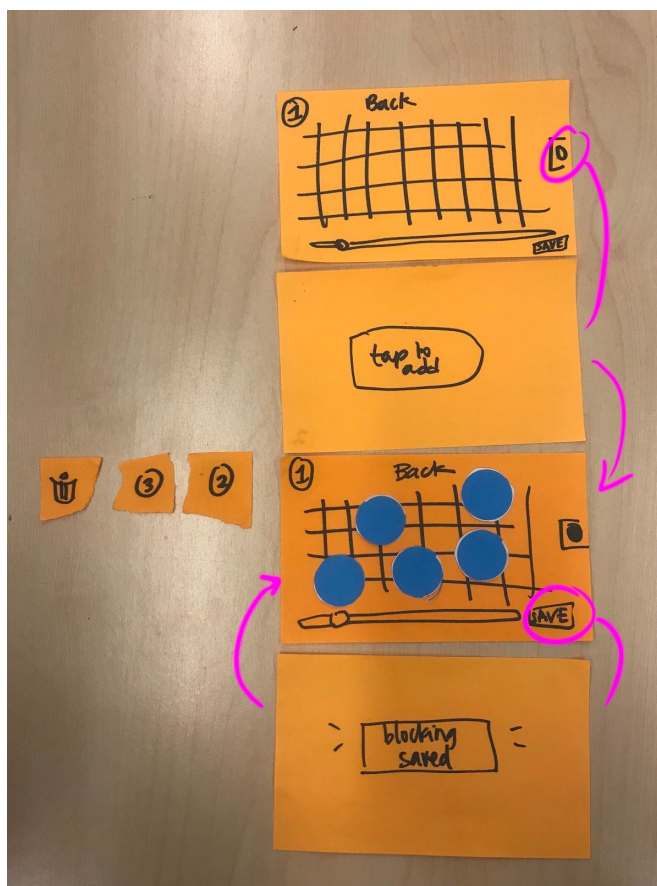


Figure 5. Creating formations task flow

The creation page is laid out with a simple grid taking up the majority of the space. Tapping the addition tool triggers an informative popup, after which the user can tap the screen to add dancers. The top number denotes the formation the choreographer is creating, incrementing each time they save a formation. Long tapping a dot allows users to delete dots.

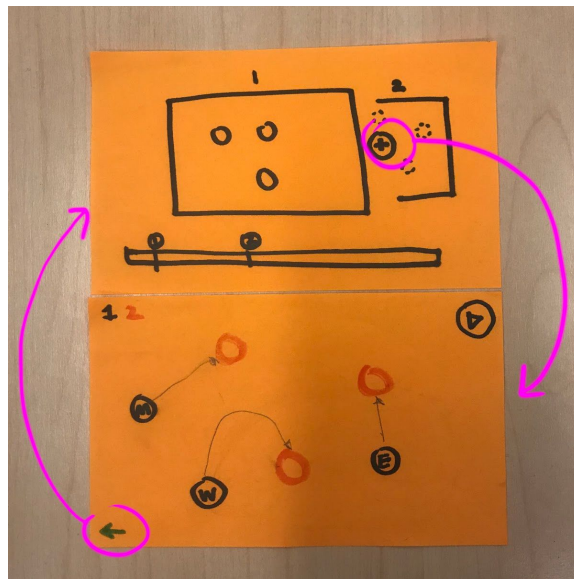


Figure 6. Adding transitions task flow

After users have created their formations, they enter review mode, in which all of their formations populate a carousel. Flags along the music bar denote where each formation starts. To add a transition, users click the plus sign and are brought to a transition screen. Here they can drag people along a path to reach their second blocking state.

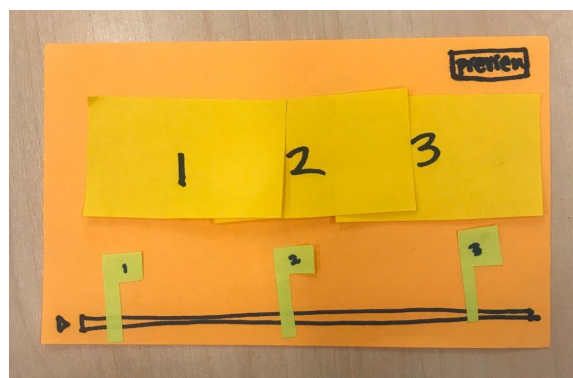


Figure 7. Moving formations with music task flow

To sync formations with music, users press the play button in the bottom left corner to see formations along with playing music. Users can click into scenes to edit and drag the flags on the music bar to change the formation start time. Pressing the preview button takes them to a fullscreen preview of the formation changes with the music.

## Method

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### Tasks

In order to test the aforementioned 3 tasks in the prototype description, we have specified exactly what 3 tasks the user will perform by putting quantitative measures and additional steps to these tasks:

1. Create 3 different formations and make modifications to these formations.
  - a. Remove a dancer from a formation
2. Create and modify one transition between the first and second formations that the user has already created.
  - a. Change the path of one of the dancers' transitions
  - b. Attempt to go back into formation 1 for edits
3. Sync transitions with the music
  - a. Rearrange formation orders

### Participants

The participants of our prototype testing ranged from dancers with a ballroom dance background to dancers from a nationally recognized urban dance team:

- A postgrad from Columbia from Syndicate, a renowned dance team that has won multiple dance competitions
- A Stanford alumni who formerly choreographed for Stanford Swing as well as the Viennese Ball
- A Palantir engineer who is part of a Bay Area competitive urban dance team

We aimed to find participants who had experience with large groups where formations are quintessential, such as urban dance and K-pop. However, to test an extreme user and glean unrepresented opinions, we included a ballroom dancer. In order to compensate our participants for their time and energy, we provided our participants with Starbucks gift cards.



## Procedure

Before testing, our team set all the paper prototypes and materials out on the table. Our team maintained a testing procedure for each test:

1. Briefly introduce the goal of the app
2. Introduce basic mechanics of app navigation (i.e. long press or drag)
3. Place paper prototype in front of the user and narrate the task. Request that the user be vocal about their thought process and start the timer.
4. If the user makes an error, the “computer” will flash a “Try Again” or “Feature Not Yet Implemented” card
5. Once the task is completed, our team will question the rationale behind certain user choices. End the timer.
6. Repeat 3 - 5 until done with all three tasks.
7. Discuss themes throughout testing and ask for further suggestions or concerns

All of these tests were held in relatively isolated, quiet environments.

## Roles of Team Members

- App / Computer : Jeremy, Melinda
- Recorder : Jeremy, Alex
- Facilitator: Sarina

## Measured Data

The primary data metrics that we kept track of was the amount of time it took for each participant to complete each of the 3 tasks, the type of errors that they made in attempting to complete the task, and the UI features that were particularly easy to understand.

## Results

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### Task 1

All three participants experienced some degree of difficulty with first pressing the circle button on the right and then tapping the grid to add dancers (Figure 5). Two of them began by first pressing the grid, while the third intuited that it must have some sort of functionality. Additionally, the process of deleting a dancer favored long-pressing an icon and then tapping it to delete.

### Task 2

Task 2 found itself to be straight-forward in how transitions are created and navigating the transition screen. However, one participant attempted to tap the line drawn for a transition in order to delete it, rather than tapping the origin of the transition (Figure 6).

### Task 3

In order to swap formations, all three participants opted to move the flags rather than the frames. They all expressed that it was not intuitive to be able to manipulate the carousel frames, as such was not possible in other apps. Transitions were themselves an area of inquiry, as each participant wished to know the consequence to transitions between swapped formations. Moreover, two participants wished to know the duration of a transition between formations. Finally, all were confused as to the difference of the 'preview' button and 'play' button, though two of them managed to guess correctly (Figure 7).

## Discussion

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### Task 1

We realized that adding people to a formation would likely be the first mode of interaction with the formation screen and decided to make adding people to a formation the default selected mode. The participants would intuitively long press and tap on a person to remove them from the formation, instead of long press and dragging the person to the trash can icon, due to similar functionality in other apps (such as Gmail) and for deleting apps. Therefore, we decided to adopt this into the deletion process.

Since the “Back” text at the top of the formation screen created some ambiguity as to whether it meant the back of the stage or was a way to refer to a previous formation, we decided to replace the text with “Audience” to indicate the orientation of the stage. Also, we decided to add a play button so that the choreographer can still listen to the music when creating formations. Since the number in the top left meant to indicate which formation you are currently editing evoked some confusion in our participants, we decided to change the default naming of formations from just numbers (1,2, etc.) to Frame 1, Frame 2, etc.

### Task 2

Based on participant feedback, we decided to add a pop-up that asks for the length of the transition upon saving the transition. Participants also wondered about taking into account people off-stage, which we plan to flesh out further in the future.

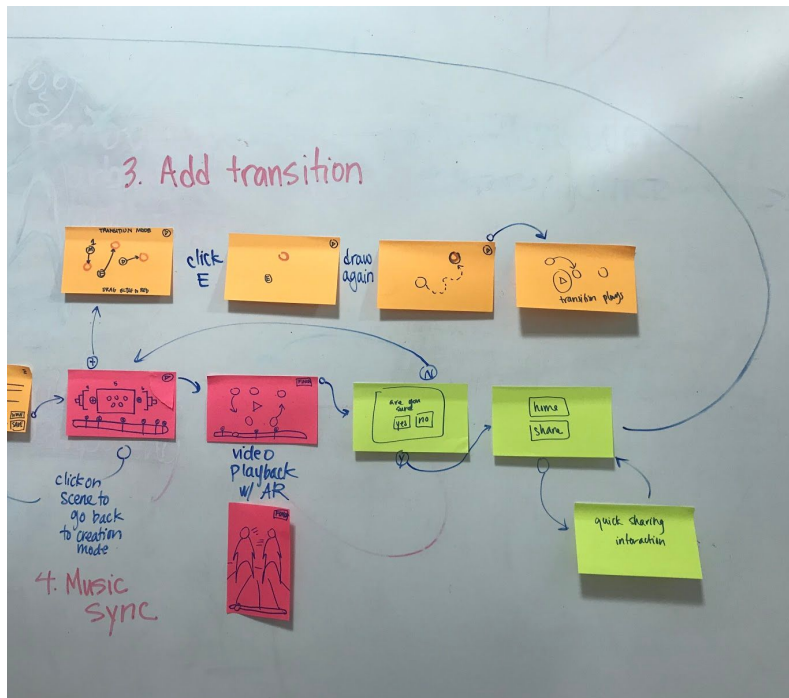
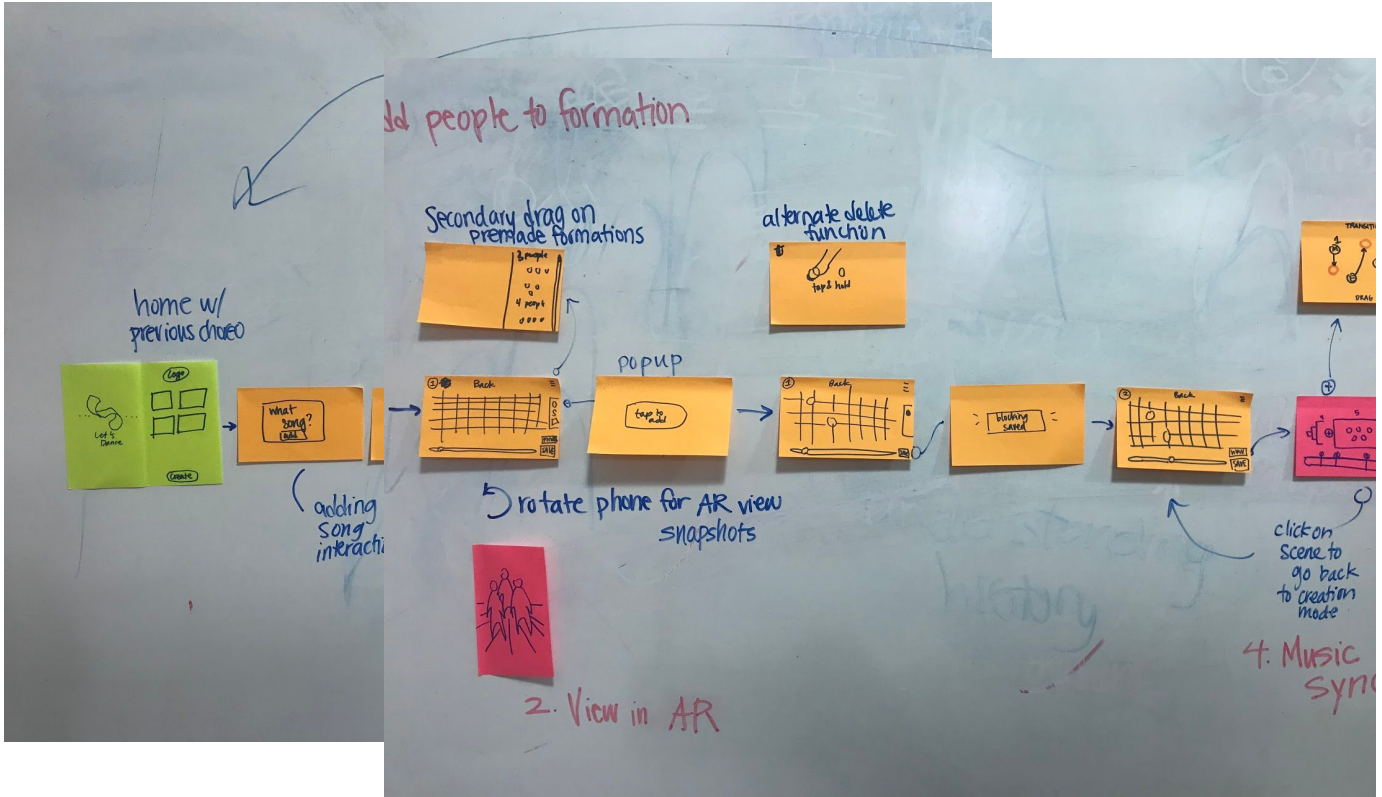
### Task 3

We plan to make the carousel non-interactive, since none of the participants interacted with the carousel. We will add a pop-up that alerts the choreographer when transitions would be deleted. To resolve the confusion between the “Preview” and the “Play” button, we plan to test wordings that would clarify the purpose of the button.

These changes, based on the results of our testing, should clarify the functionality of our UI and promote increased ease of use for the choreographer.

# Appendix

## Interface Image Close Ups



**Consent Form**

The Let's Dance application is being produced as part of the coursework for Computer Science course CS 147 at Stanford University. Participants in experimental evaluation of the application provide data that is used to evaluate and modify the interface of Let's Dance. Data will be collected by interview, observation and questionnaire.

Participation in this experiment is voluntary. Participants may withdraw themselves and their data at any time without fear of consequences. Concerns about the experiment may be discussed with the researchers (Alex Lee, Jeremy Marcelo, Melinda Wang, Sarina Wu) or with Professor James Landay, the instructor of CS 147:

James A. Landay  
CS Department  
Stanford University  
650-498-8215  
landay at cs.stanford.edu

Participant anonymity will be provided by the separate storage of names from data. Data will only be identified by participant number. No identifying information about the participants will be available to anyone except the student researchers and their supervisors/teaching staff.

I hereby acknowledge that I have been given an opportunity to ask questions about the nature of the experiment and my participation in it. I give my consent to have data collected on my behavior and opinions in relation to the Let's Dance experiment. I also give permission for images/video of me using the application to be used in presentations or publications as long as I am not personally identifiable in the images/video. I understand I may withdraw my permission at any time

Name: \_\_\_\_\_

Participant Number: 2

Date: 10/23/18

Signature: \_\_\_\_\_

Witness name: Melinda Wang

Witness signature: \_\_\_\_\_

Participant 1 Consent Form

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Name: \_\_\_\_\_  
Participant Number: 2  
Date: 10/23/18  
Signature: \_\_\_\_\_  
Witness name: Sarina Wu  
Witness signature: \_\_\_\_\_

Participant 2 Consent Form

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Name: \_\_\_\_\_

Participant Number: 3

Date: 10/24/18

Signature: \_\_\_\_\_

Witness name: Jeremy Marcelo

Witness signature: Jeremy Marcelo

Participant 3 Consent Form

Word Count: 1482