

An auditory display system would encourage effective dance training techniques by sonifying muscle contraction, weight distribution, force, and motion capture data. The system aims to help student dancers advance their proprioception and help instructors better understand their students' performances. The system will support ballet students while training fundamental skills and while running combinations. With the system, dancers will better understand the details of and reinforce the structure of discrete fundamental movements, and dancers will be able to maintain awareness of their body and their execution of technique during more complex combinations. This will allow for injury prevention and more effective training both inside of and outside of the studio.

Intended User Persona

Amanda is an intermediate ballet student studying to become a ballerina for her future career. She has been dancing for most of her life, attending classes for about 8 years, and she hopes to dance for the rest of her life. She is 18 years old and is beginning to study ballet in college. Because she has danced from a young age, she understands the basics of ballet and is working to reinforce good technique and break bad habits. Amanda struggles with ankle injuries related to her past training that cause her to periodically take breaks from training. This frustrates her because she cannot pinpoint why her ankle issues keep resurfacing, though her instructors believe it has to do with improper form.

Amanda wants to become a better dancer while staying injury free. She fears that she may not be able to sustain a lifelong career if her ankle injuries persist or worsen. Amanda wants to improve her form to become a better dancer and to relieve her injuries. During class, Amanda adapts her form according to her instructors' critiques and reminders, however, she has a hard time remembering or preserving the correction over time. She especially struggles whenever she is training on her own, without an instructor. She tries to video record herself or work with a mirror, but both lead to issues. When using a mirror, she can't always see herself and it causes her to break alignment when trying to look in the mirror. When video recording herself, she can't make dynamic, in the moment changes. And with both techniques, her corrections never seem to stick.

User Scenarios

1. Amanda is warming up at the barre during ballet class. The class is working through a plie combination. Her instructor informs Amanda that her alignment is off and that she is not pushing through the floor. Amanda's instructor moves her body into proper position and moves to the next student. Once her instructor leaves, Amanda is afraid that she will break alignment again, and she wasn't confident in what her instructor meant by pushing through the floor. She doesn't think fully understood the correct movement and is worried about replicating it.

With the auditory display system, Amanda will hear the contraction of her muscles and weight distribution and will be given alignment cues. When her instructor adjusts Amanda's form, she will hear what a proper plie sounds like, helping her solidify what it feels like. Once her instructor leaves, Amanda will continue hearing the sounds of her muscles and weight distribution. She will try to match the sounds she heard while her instructor was guiding her to help her use and reinforce proper form. The system will also remind Amanda to check her alignment, and if it becomes extremely incorrect, audio cues will be given to guide her back to proper alignment.

This is an example of the system's use in repetitive fundamental training within a studio. Once the proper form sonification is recognizable, this could also be used outside of the studio. Here, the user chooses to hear a continuous sonification to understand how their muscles are working, and the user may choose to target specific muscle groups.

2. Amanda is working across the floor on her leaps. While she is rehearsing the leap series, her ankle occasionally hurts when landing the leap. It is not bad enough to stop practicing, but Amanda knows it will hurt her tomorrow. Amanda cannot see herself in the mirror while running the series, and her instructor hasn't given her any specific form critiques regarding her landing.

With the auditory display system, Amanda will hear the sonification of her leap in real-time as well as during a second playback afterwards. Specifically, she will hear a sonification that will help her understand the impact force of her landing, the

distribution of weight on her foot during her landing, and the contraction of her leg muscles that absorb the shock of landing. The system will color the sonification during the second playback to reveal potentially dangerous technique errors. From this sonification, Amanda will understand the mechanics of her leap that led to the pain in her ankle. She will continue leaping and listening to the sonification, to make adjustments to her form.

This is an example of the system's use in a more discrete way to track targeted issues in or out of the studio. Here, the user will be able to choose to hear the sonification playback in and out of real time, and the user will be able to set the system to alert for injury causing behavior.

3. Amanda is rehearsing a combination she learned in class at home. In class, she remembers getting the correction that she was breaking alignment and was carrying too much tension in her arms and neck. She does not have a mirror at home, and she is having a hard time noticing if she is falling into those bad habits while she is dancing. She can watch a video of herself afterwards, but, even though she can see her tension in the video, she can't translate the correction while rehearsing. When she focuses too much on her tension and alignment, she messes up the choreography. As she practices more and more, her alignment, tension, and energy levels get worse and worse, so she cannot correct the issue.

With the auditory display system, Amanda will hear audio cues to correct her tension and alignment while she is rehearsing the combination. The system will alert Amanda when she has too much tension in her body and will specify where the tension is being carried. The system will also remind Amanda to check her alignment if it becomes too far out of line. Amanda will be able to adapt in real-time to the sonification of her performance to correct her performance mistakes. She will better understand where her bad habits appear while being able to focus on the choreography.

This is an example of the system's use in a less obtrusive way, where continuous sonification of the entire body is not necessary, only specific reminders. Here, the user will be able to choose which areas to focus on sonifying.

Project Deliverable #2

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References

The user persona and scenarios were inspired and adapted from conversations with Naomi Costanza, a Musical Theater major, Dance minor, and nine-year student dancer.