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CS 4590

6/29/2021

Project Deliverable 3

Simulator Design Document

1. **Overview of project idea**

Day by day, we as humans perform a multitude of task, which can either be physical task or mental task. Usually, the person performing mental task are sitting behind a computer screen at a desk all day. An unhealthy posture is developed from prolong exposure to this position and lack of exercise to reduce stress from this position. Most people who are struggling to fix this can use yoga, to which they can use an auditory sonography to provide correct feedback to help them gain flexibility and comfort within their body again.

2. **Final versions of your user persona and scenarios**

User Persona

Kamal is 32 year old office worker that sits on a computer for 8 hours a day, from Monday to Friday. He rarely gets up during work unless it's for a break or to use the bathroom. His posture while performing his work is atrocious to where he began suffering back and neck pains.

Kamal has been working for this company for many years, accumulating a new bad posture to which he wishes to change using yoga. He has no time to go to in person classes as he has kids, he must take care of and other responsibilities. His best time is at night, where he uses YouTube videos as his guidance to help. He notices that when practicing some of the techniques and movements, he finds himself either not doing it right or unable to even tell if he is doing it right, sometimes resulting in pain after a session.

The next morning, he wakes up in more pain than the previous night and blames it on yoga as a whole, when it was really his lack of auditory feedback for his performance of the yoga exercise. This pain has left him feeling sluggish and out of his element during work, thus resulting in a poor workday. He comes home and repeats the process in hopes for change, but the same results happen again for the next session.

Scenarios

Kamal is beginning a yoga session with the sonifyer and is off to a great start. He then stumbles across an exercise he usually finds difficulty performing. He attempts to do the exercise but begins wabbling and loses his balance. He can watch the video thoroughly and try to replicate what the instructor is doing exactly but since the instructions are prerecorded, it is hard to make the necessary adjustments for the exercise. The sonifyer helps by providing deviations of all your joint angles and limb positioning. Audio cues will be provided to indicate and notify

when Kamal has entered a “Danger Zone” whether it be from poor weight distribution and poor body alignment.

Kamal is beginning a yoga session. He performs all exercises accurately but wants to get more out of it. He feels simply replicating what he Is watching is not enough and isn’t as satisfying as it used to be. With the sonification system implemented, there will be a constant stream of calming music played to give to the yogi, along with complementary feedback if the yogi is performing the exercise correctly. This boosts the yogi's confidence and motivation to continue practicing yoga. The opposite can happen, as if the yogi is performing the exercise incorrectly, then they will be provided with warnings and negative feedback (constructive criticism) for them to adapt and adjust their performance.

3. **Event Description**

The simulator will initially begin learning through an input of metrics from the user (weight, arm length, leg length, etc.). The movement of the yogi will affect the values displayed on the UI to provide useful feedback to help the yogi perform the exercise correctly. All events will come from JSON files.

EVENTS:

Weight Distribution

- Position from center (0) and xy positions withing a range of [0, 1]
- Dangerzone (Good, “Warning”, Bad) - (strings)
- Force: Downward Z value
- Priority (1-3, where 3 is highest priority)
- Timestamp (miliseconds)

Alignment/Posture Accuracy

- Percentage correct (floating point number)
- Dangerzone (Good, “Warning”, Bad) - (strings)
- Priority (1-3, where 3 is highest priority)
- Timestamp (miliseconds)

Deviation from Correct Values

- Percentage off (floating point number)
- Constantly displayed next to joint angles / limb length
- Timestamp (miliseconds)

Event Example:

Alignment:

- Percentage: 75 Percent
- Dangerzone:
- Priority: 1
- Timestamp: 500

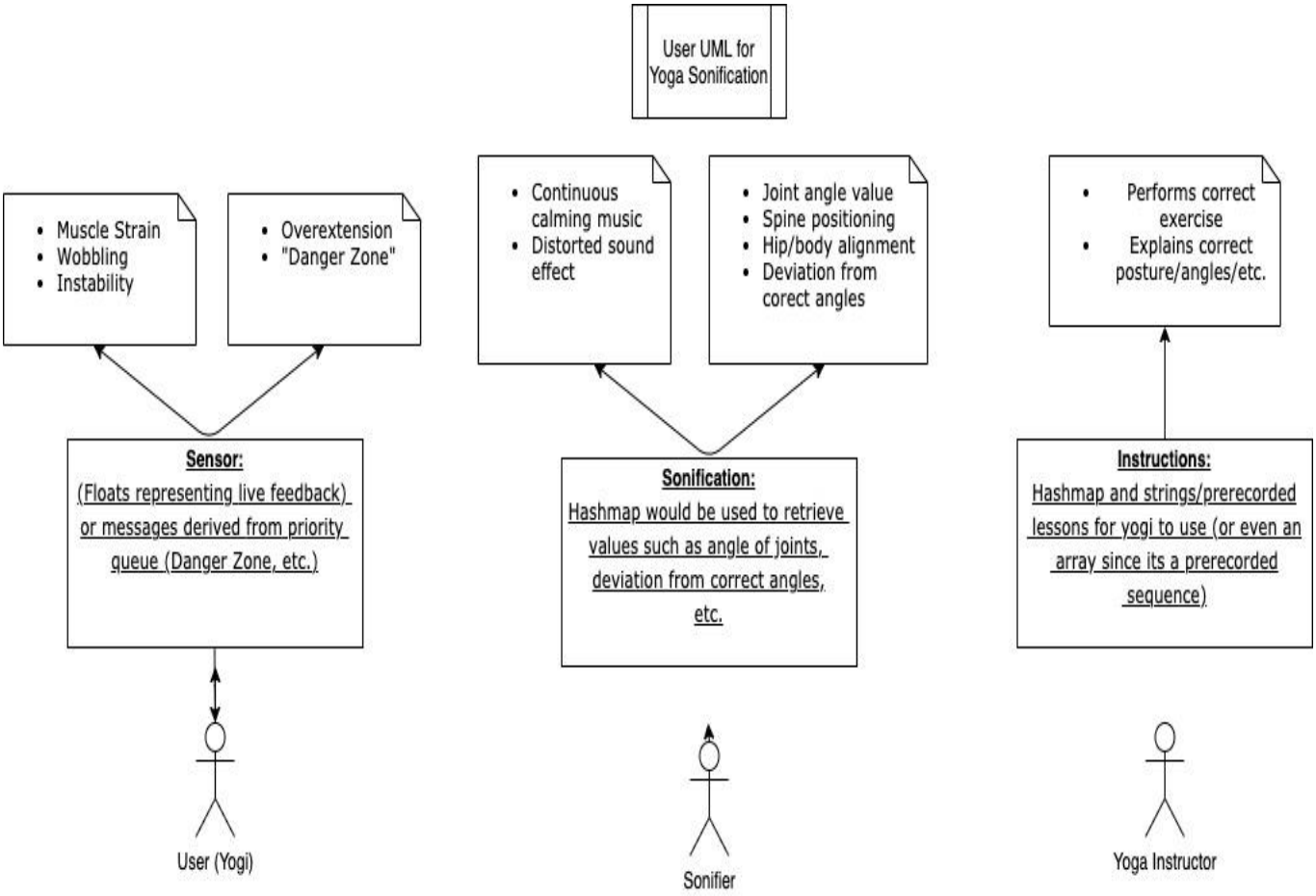
Deviation:

- Limb/Joint: Left arm
- Correct Value: ...
- Current Value: …
- Deviation: ...
- Timestamp: 750

4. **Describe the user experience of your simulator**

The user will begin and synchronize the auditory feedback system with the event stream and get live information that will either correct the user of their yoga or notify them that they are performing the exercise accurately and correctly. The UI elements will be statistical information such as angles and measurements of joints and ligaments (will display current live angle and correct angle if exercise is performed incorrectly). There will be a continuous calming music playing to reflect the yogi's experience, and when an exercise is performed incorrectly, there will be a distorted sound and the background music will decrease in volume until the exercise is correctly performed.

5. **Software architecture**



Detailed timeline

WEEK	GOALS
July 5-9	Research example events/data via JSON files in real-time (~1-2 days) Formulate plan for handling events (quality)
July 12-16	Work on sonification functionality (~2-3 days) Text –to-speech (Find appropriate simulator) User manual, simulator appropriateness, User interface Deliverable 4 due: JULY 15th (Simulator)
Jully 17-23	Identify and explore research questions Identify participants Describe measures, protocol (procedures for running evaluation), and an analysis of data collected Deliverable 5 due: JULY 17th (Evaluation Plan)
July 26-30	Reflect on all feedback/comments and everything done and apply what I've learned to this section.

	Deliverable 6 due: JULY 28th (User Evaluation)