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CS 4590

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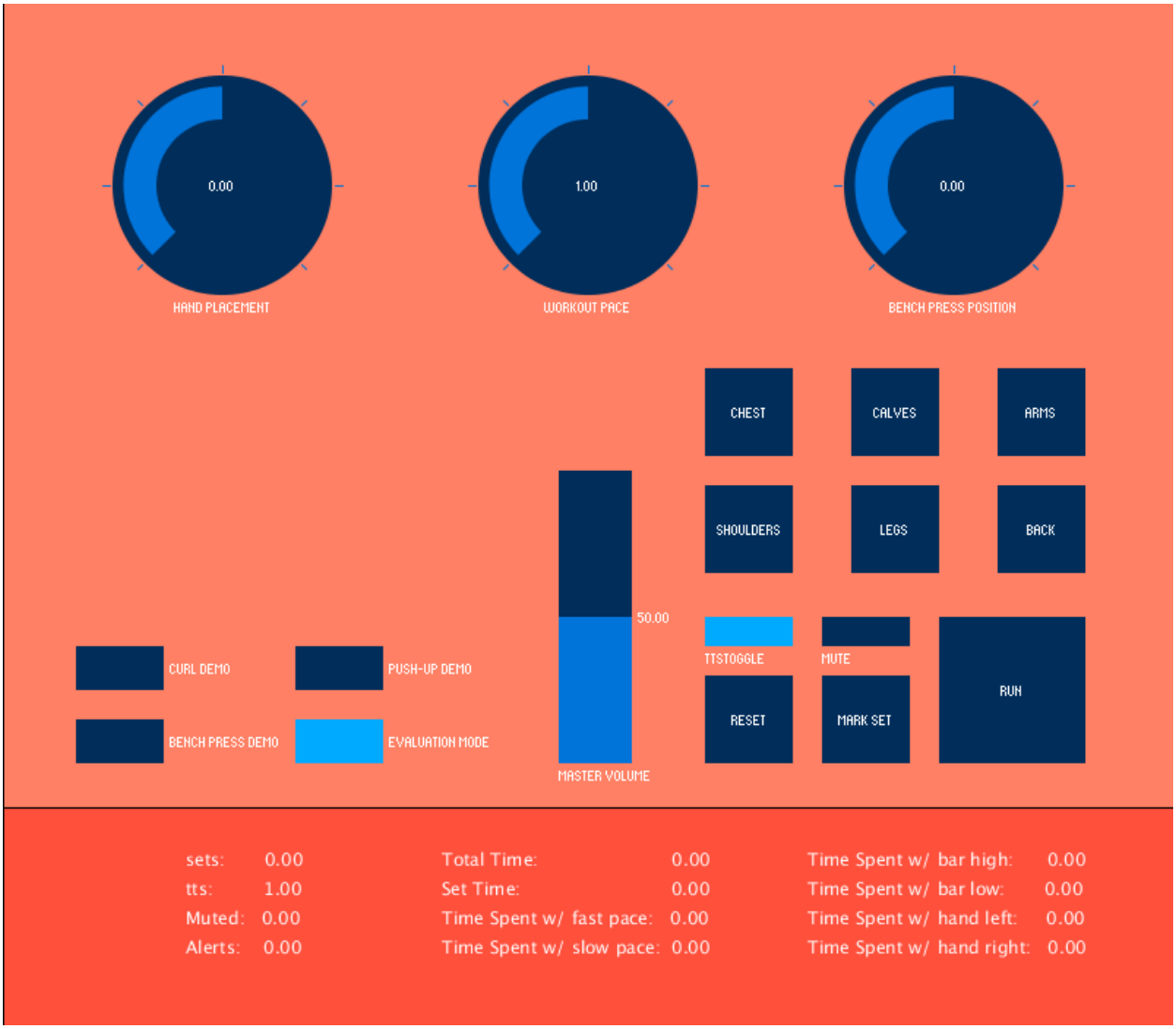
Weightlifting Simulator User Manual



How To Use

To get the full experience of the simulator, it is recommended that you select one of the demos from the radio button configuration in the bottom left. Once you have selected a demo, pressing run will begin the simulation, and the simulator will begin manipulating the audio through the instructions given through the JSON files. Additionally, the user can manipulate the sound themselves by clicking evaluation mode before pressing the run button. Once this is done, the user will be able to change the values of the knobs, sliders, and buttons during the duration of the audio to manipulate it to their own specifications. The reset button is used to reset the simulator to its initial startup state, and the mark set button is used to indicate that a workout set has been completed, which is useful for data collection as well as for indicating to the JSON file when to stop the demo. The mark set button will also reset most of the simulation, with the exception of a few of the data collection variables.

Sonification Scheme

- The inappropriate/dangerous muscle contractions that are performed by the user are sonified through two methods, which can be toggled on and off by pressing the TTSToggle button prior to pressing run
    - The first method is a text to speech alert, which says aloud the name of the muscle group which is currently being injured or incorrectly being used
    - Second method is a wave which is being modified by an amplitude envelope to create a beeping noise to alert the user.
        - The pitch of the wave is changed depending on the muscle group in order to allow the user to distinguish between them.
- The speed at which the user is working out is reflected by the music becoming either faster or slower. This is controlled by the middle knob labeled “workout pace”
- The hand placement knob performs panning on all auditory feedback provided to the user. This is done to sonify the user’s hand position when performing a push up or bench press as being too far left or right.
- The bench press position knob applies a low pass filter to the music as you twist it left, and a high pass filter as you twist right. This sonifies the user’s position of the bar relative to themselves when they are performing a bench press.

- If they are performing workout with bar closer to head rather than upper chest, then the high-pass filter will apply
- If they are performing workout with bar too close to the middle of their chest, then the low-pass filter will apply

Scenarios

Although I have made some adjustments to my implementation that differ from the plan I laid out in my proposal, the overall ambition of the simulator has remained largely unchanged. The goal of this simulation is to provide a user with auditory feedback during their workout that will aid them in making dynamic adjustments as they perform the exercise. To achieve this, I have created a simulator which sonifies many different aspects of three specific kinds of exercises, which are bicep curls, push-ups, and bench presses. The user interface allows for the manipulation of these sonification's, which allows for the user to play around with differing settings to get a feel for how the audio might sound once they are actually being evaluated. Additionally, the simulator displays various statistics which are helpful in gauging what types of auditory feedback is being administered, and the extent to which the sonification is occurring throughout the duration of a particular workout.

JSON #1 – Bicep Curl

This JSON file showcases the scenario in which a bicep curl is being performed. This scenario possesses the least amount of auditory manipulation, as the only factors that are being taken into account are the user's unsafe muscle contractions, as well as how fast they are performing the workout. This file can be loaded by pressing the curl demo button on the UI, then pressing run.

JSON #2 – Push-up

This JSON file showcases the scenario in which a push-up is being performed. Though I have changed the exercise from what it initially was in my proposal, which was a pull-up, this scenario still serves to sonify the same element as I planned with the pull-up, which was the users hand placement when conducting the exercise. In addition to sonifying the users hand positioning, this scenario also implements the sonification that were present in the bicep curl scenario, as they are relevant to this exercise as well. This file can be loaded by pressing the push-up demo button on the UI, then pressing run.

JSON #3-Bench Press

The last JSON file showcases the scenario in which a bench-press routine is being performed, and is the most complex of the three in regard to the sonification. In addition to including the same sonification of elements present in the previous two scenarios, the bench press scenario also factors into account the way in which the user is holding the bar above themself when performing the exercise. To load this file, press the bench press demo button located in the bottom left of the UI, then press the run button.

Evaluation Mode

This mode allows for the user to manipulate any of the sonification elements as they see fit. It is entitled evaluation mode as it is the mode I will be using when conducting my wizard of oz style of data collection for my planned research. This is also the mode that is on by default, which was done so that the various aspects of the UI could be shown to the user before starting the simulation, since the demo hides the majority of these elements so that it doesn't interfere with the instructions being loaded in from the JSON file. To begin manipulating the backing audio track in real time, press the evaluation mode button located near the bottom left of the UI, then press the run button.