INTRO/ABSTRACT

This pilot study explores the synthesis of visual and tactile cues to induce a perceived sense of weight. Using a tactile glove with variable vibrations, the experiment examines conditions such as tactile intensity (small, medium, large), virtual dumbbell sizes (small, medium, large), virtual stress balls with different elasticities (high, medium, low) and various visualizations. The study assesses scenarios ranging from no virtual dumbbell with or without tactile feedback to those involving both virtual dumbbells and tactile stimuli.

METHODS

The research assesses the exercise experience in virtual reality and actual performance by employing EMG sensors to gauge muscle response, Heart Rate (HR), Galvanic Skin Response (GSR), and hand tracking. These biometric indicators provide a thorough comprehension of the physiological and experiential effects under varying conditions.

To generate tactile feedback in the game environment, the study utilizes bHaptics Tact Gloves. The vibrations produced by these gloves replicate the sensation of weight from virtual dumbbells and stress balls.
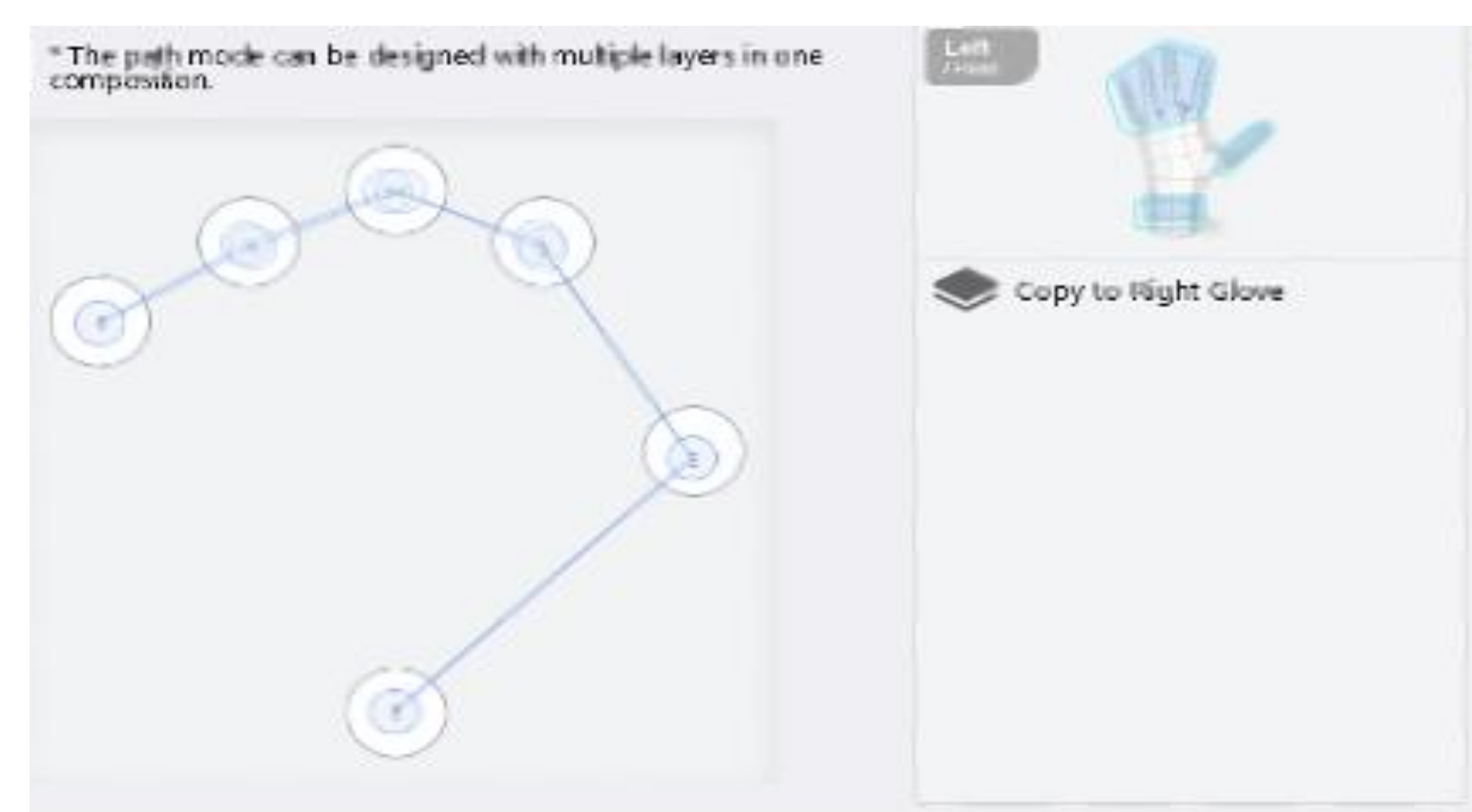

Fig.1 -Haptics Vibration Pattern used when lifting medium weights

The project was developed with:
Game Engine: Unity 2020.3.13f1
Scripting: C#, Visual Studio

Using a virtual environment and tactile feedback to simulate weight.

Fig.2 – bHaptics Tact Gloves being used to provide feedback from petting a dog

Fig.3 – Overview of virtual gym environment

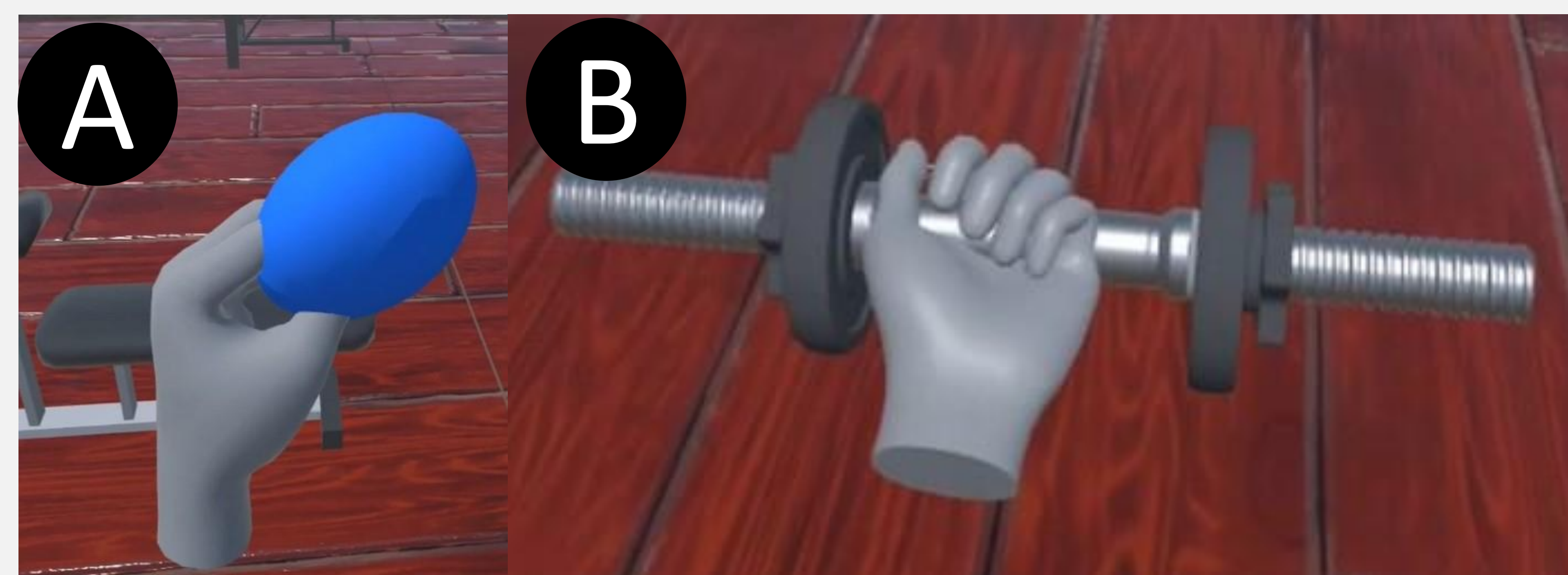Fig.4 – Virtual hand interacting with virtual stress ball and dumbbell

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