

Virtual Gym_{VR}: Serious Exergame Platform for Personalized Physical and Cognitive Activities

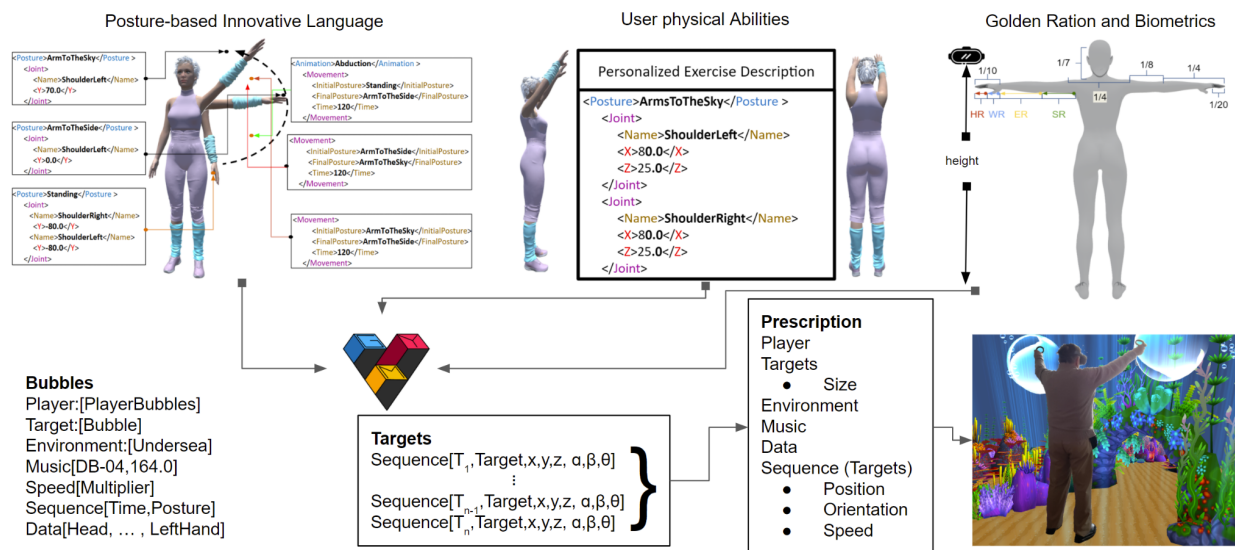
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Description

Virtual Gym_{VR} is an exercise platform that offers personalized activities, specially designed for physical and cognitive training of older adults. The individualized exercise programs (prescription) are configured to match the user's capabilities. The platform controls the virtual-reality environment by presenting obstacles and targets, positioned in a way that affords the user's personalized postures and movements. The speed and rhythm of the activities are adjusted for a comfortable yet challenging exercise session. The complexity of the game-like environment and the game mechanics are also adjusted to the cognitive abilities of the user. The game catalogue of Virtual Gym_{VR} is co-designed with older adults to capture their preferences, handicap adjustments and set up an intuitive interaction based on basic rules.

Virtual Gym Prescription Pipeline



Virtual Gym Games:

Bubbles



The player uses both hands to reach pairs of bubbles in a series of stretches. To reach the bubbles, the player must stretch up, down, and to the side.

Personalized Characteristics

- Bubbles' Position
- Holding Time Speed

Challenges

- Resistance
- Coordination
- Concentration

Balloons



The player can use their left hand to pop balloons and their right hand to push balloons around.

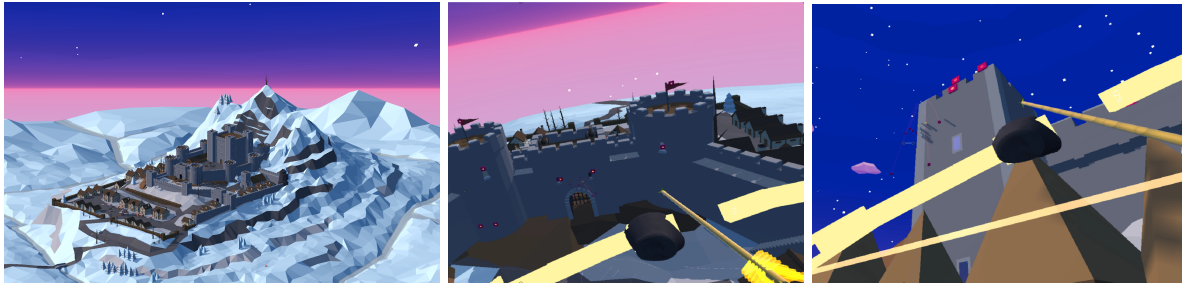
Personalized Characteristics

- Balloons' Position
- Balloons' Movement
- Speed
- Balloons' Hand Color change

Challenges

- Resistance
- Coordination
- Concentration

Archery



The player makes a sequence of coordinated movements to hold the bow and arrow. The targets are placed at the proper length and elevation based on the posture information.

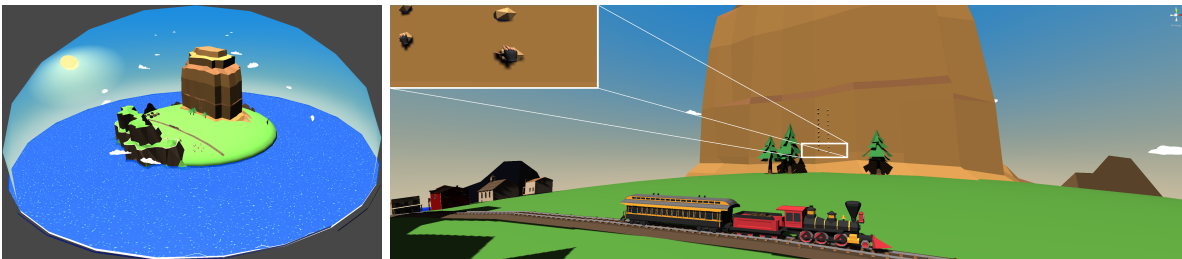
Personalized Characteristics

- Targets' Position
- Targets' Orientation
- Gravity

Challenges

- Resistance
- Coordination
- Concentration

Climbing



The user reaches and stretches in a step climbing environment. Participants attempt to climb a mountain using the controllers to get climbing rocks and advance at a proper rhythm to grasp the next climbing rock with coordinated hands to reach the top.

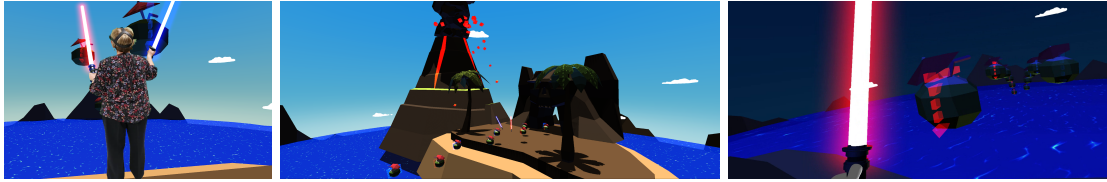
Personalized Characteristics

- Rocks' Position
- Climbing Speed
- Grab Coordination

Challenges

- Resistance
- Coordination
- Concentration

Slice Saber



The players cut targets in half, following the direction indicated with the arrow. Several two-colour targets are placed in front of the users with a sufficient distance to coordinate their movements. The position of the blocks stimulates the users to adopt the postures when they slice the targets with the correct direction and hand.

Personalized Characteristics

- Targets' Position
- Targets' Colour
- Targets' Position
- Targets' Orientation
- LightSaber Colour
- Music

Challenges

- Resistance
- Reflexes
- Coordination
- Concentration
- Focus
- Rhythm

Flying Rings



The player flies through a sequence of rings by stretching the hands to the front or sides. The targets are placed at the proper size and position based on the posture information.

Personalized Characteristics

- Rings' Position
- Rings' Size
- Hands Speed
- Hands Coordination

Challenges

- Resistance
- Coordination
- Concentration