



## Description

• The aim of this task is to develop. serious games that can be used during balance physiotherapy

• The main aim of cognitive training and exercise games, is to create an environment for empowering and motivating people during their balance physiotherapy.

Gamification of the balance physiotherapy

Interaction within the **AR** environment

## Main Functionalities

All exergames are divided in four groups according to the exercises in the flowchart that player should do: standing, sitting, walking and bending.

### **STANDING**

A virtual seal with a ball on its nose appears in front of the user. The seal is dancing with the ball as long as the user is standing still. For successful performance of the task the player is awarded with badges.



## SITTING

The virtual scene in the sitting exergames contains a bird on a wooden floor stand base. The image of camera frame is moving and the player determines the direction of its movement by moving his head.



have aim to

related to

The cognitive games

improve following

cognitive skills:

problem solving

visuospatial, rapid

visual information

reaction time and

processing, memory,

COGNITIVE

GAMES

**EXERGAMES** 





## WALKING

The virtual scene shows a flower at the end of pathway with a vegetation and a hummingbird. The hummingbird is flying to the flower. The player should follow the bird with or without head movements

### **REMEMBER PREVIOUS**

When this game is selected be table with a magician hat and an animal below it will appear ir front of you. The goal is to select i the animal was same or different from the previous by choosing the right button.

When the Animal feeding game is presented there will be multiple rabbits on the screen with different signs on their back. Your goal is to feed each rabbit only once by selecting them.

attention.

#### **MEMORY GAME**

When the Memory game selected a number of cards appears. The cards will disappear and appear again in a few seconds but in different order. The goal to select the cards as they were presented the first time..



## **BRIDGE CROSSING**

When Catch food game is selected a basket and a few branches appear. The goal is to pick all apples that fall by picking them up with the basket which player moves by moving their head to the left or right.

CATCH FOOD

The balls are falling from the holder and are following the wooden path. Your goal is to move the bridges in the appropriate positions in order to get as many balls in the appropriate wooden houses.

## References

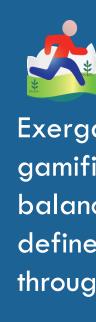
Studer M. Making Balance Automatic Again: Using Dual Tasking as an Intervention in Balance Rehabilitation for Older Adults. SM Gerontol Geriatr Res. 2018; 2(1): 1015.

# THE COGNITIVE TRAINING GAME

Motivate people during their balance physiotherapy

## Methodology

- AR enables interaction with the environment that cannot be ignored when it comes to maintaining walking, standing, or even sitting balance.
- Method for improving athletes' motor performance regardless of environmental complexities has been adopted in the CTG in order to cause patients to allocate their attention from the secondary tasks in order to process a primary task.
  - Dual task is an untapped opportunity to more fully improve patient's functions through the reaction speed, accuracy, tolerance of distracting environments, and awareness of unsafe task demands.







The software communicates with the Edge computer which is responsible to estimate patient condition based on which the software will make interruptions and promote accessible interaction

hands above the head.

ANIMAL FEEDING

Selma Papegaaij, Floris Morang; Frans Steenbrink, Virtual And Augmented Reality Based Balance And Gait Training, Improve Human Performance, 2017

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RESTRICTIONS

Only games approved by doctors could be played

# GAMES

### INTERNET **OF THINGS**

Sensors evaluate the results of the patient advance user experience

## EXERGAMES

Exergames present the gamification of the balance physiotherapy defined by clinicians through the flowchart.

## EGDE COMPUTER

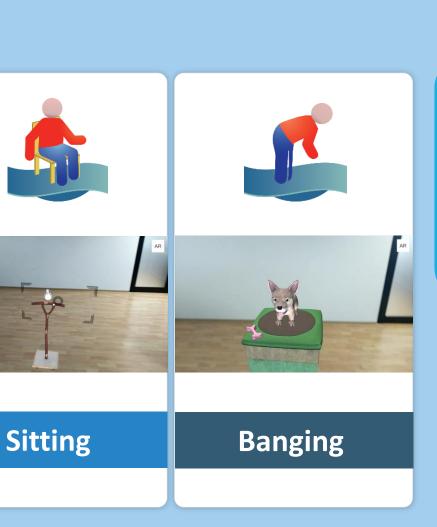
Edge desktop computer capable to run real time evaluations on the sensor captured data, in order to give real-time feedback

PATIENT



## Technology

Unity framework is enabling integration of CTEG with Android in unified manner. It provides access to all hardware resources of the smartphone enabling augmented reality presentation and interaction. • REST APIs are used as protocol for communication between CTEG and Edge computer in both directions in stateless manner. Interface of this kind allows CTEG to receive feedback regarding evaluation of player performance in real-time and provides interoperability.



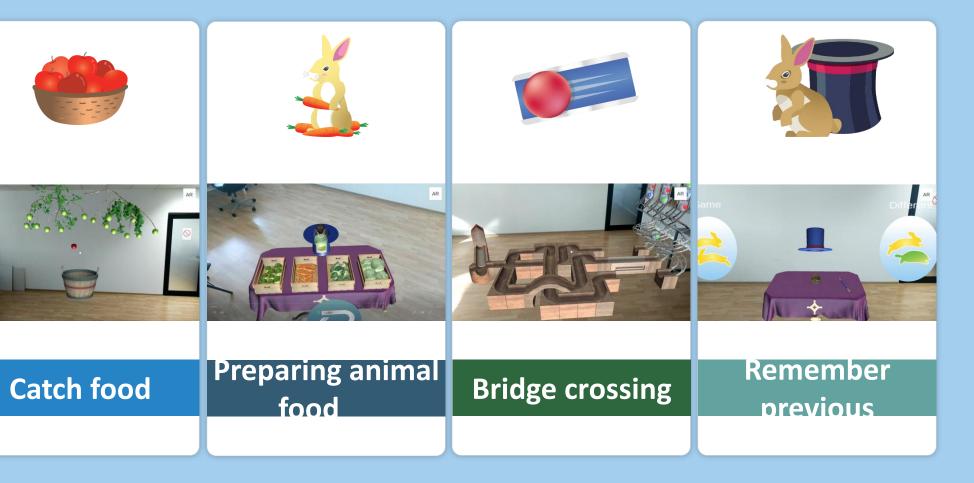
## **Initial Scoring Setting**





Initial testing on 4 healthy adults 65+ was made **STEP 3** 

First setups of scoring functions have been made. The implementation of this task is going in tight cooperation with clinicians.



The first version of the software is hosted on the smartphone where user wears head mounted adapter to keep a smartphone at a set location on the head of the user.









