

# D3.2

## Training software



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AMBIENT ASSISTED LIVING

JOINT PROGRAMME

AAL-2013-6-134

## Document history

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## Table of Contents

1.	Preface .....	4
2.	ironHand - Training Software.....	5
2.1	Exercise 1 .....	5
2.2	Exercise 2 .....	5
2.3	Exercise 3 .....	5
2.4	Graphical user interface .....	5

## 1 Preface

This document describes the software package that can be deployed in Windows PC. The training software is being implemented iteratively based on agile development methodologies and verified against the functional specification document according to the user(s) feedback gathered in WP4. A fully functional version of the training software was delivered by M12 (23.04.2015), which consists of 3 exercise games with a graphical user interface.

Iterative improvements based on the results of the feasibility study (T4.3) will be performed in the next months, to optimize the training software before the start of the orthotic and therapeutic effect studies (T4.4 and T4.5).

## 2 ironHand - Training Software

Software development (T<sub>3.2</sub>) activities were intensified following the finalization of the software requirements and once the first glove prototype was released (D<sub>2.4.1</sub>).

Internal workshops at Hocoma AG were organized to discuss the implementation of the different therapeutic goals identified in WP<sub>4</sub> (D<sub>4.1</sub>) into motivating, game-like exercises. Up to fourteen different concepts were discussed to cover the following therapeutic goals: *i*) strength, *ii*) simultaneous finger coordination (force and position), *iii*) sequential finger coordination (force and position), *iv*) motor memory and *v*) finger independence. Additionally, two concepts were discussed to provide an intuitive calibration procedure.

From these fourteen different concepts, three were selected as the most promising training concepts to deliver three therapy goals. These three exercises are:

### 2.1 Exercise 1

**Therapy goal:** Simultaneous finger coordination.

The exercise requires the user to control a robotic submarine equipped with 5 robotic arms that move according to the user's finger angle signals coming from the glove. The user is required to adapt different hand postures in order to collect coins or avoid bombs. Different coin and bomb locations encourage the user to adapt different postures and to train the simultaneous coordination of finger opening and closing.

### 2.2 Exercise 2

**Therapy goal:** Hand strength

The exercise requires the user to control up and down movements of a character on the screen using hand opening and closing movements. The user is required to move and modulate their hand aperture in order to collect points. As the level of difficulty progresses, the glove provides resistance in either closing or opening the hand (according to the therapeutic need).

### 2.3 Exercise 3

**Therapy goal:** Sequential finger coordination

The exercise requires the user to use thumb opposition movements in order to play a song (similar to a Guitar Hero game). The novelty on our approach is the user-center design, adapted to the patient's needs. When the user is not able to play a specific set of notes, the exercise will slow down and help the user identify the correct movement (s)he is supposed to execute (movement tutor).

### 2.4 Graphical user interface

A preliminary graphical user interface was developed to facilitate the feasibility tests of WP<sub>4</sub>.