Action Observation Therapy as support for conventional rehabilitation approach

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Background

Recently, based on "mirror neurons" theory, a new rehabilitation strategy known as Action Observation Therapy (AOT) has been introduced to support conventional rehabilitation approach. Core of this theory is the observation of motion activities performed by external subjects and subsequent repetition of the same activities by the patients. This new approach has been demonstrated efficient and effective for neurologic and non-neurologic pathologies. Present PhD research, using the joint effect of different methodologies and technologies based on the optimization on visual stimulus and specific biomechanics models and with a specific neuro-muscular stimulation, aims to realize and validate a new integrated methodology able to fuse conventional therapy with AOT with a computer assisted approach which can be used for both clinical environment and telecare.

Objectives

To realize and validate a new integrated methodology able to integrate conventional therapy with AOT with a computer assisted approach which can be used for both clinical environment and telecare.

Methodologies

As first step a deep study as been put in place to identify best approach to show external subject motion activity in order to maximize "mirror neurons" effectiveness. Subsequent a set of predefined rehabilitation activities have been identified by a group of clinical expertise in rehabilitation field also reviewing currently available literature and academic articles. Given this two information a fully immersive 3D visualization solution would be realized allowing the patient to perform exercises in an unsupervised 3D environment. Noninvasive technologies have been adopted to reconstruct patient upper arms movements. A set of PKIs (Primary Key Indicator) is used to measure patient's performance and to track improvements in time while performing rehabilitation session.

Expected Results and Impact

We expect two basic results: (1) an improvement of patient's abilities to perform basic everyday activities thanks to AOT and (2) acceptance of the provided solution and PKIs as standard approach to support conventional rehabilitation approachs.