Physiotherapy demonstration with NAO

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Abstract—In the context of physiotherapy within an assisted living facility, we aim to introduce new technologies that help in taking over some of the usual roles of the physiotherapist. We have already tested a semiautonomous system (NAO controlled by the physiotherapist), and we are presenting here a demo in which we would use the Kinect to make for a more autonomous system that would take over the output or judgment of the inpatient’s movements.

Index Terms—elderly’s behavior, physiotherapy, NAO.

I. INTRODUCTION & BACKGROUND

Our starting point is a previous user study performed in an assisted living facility [1], in which the physiotherapist of the center pinpointed that one of the main motivations of many inpatients for attending to rehabilitation sessions was the emotional bond they shared with the physiotherapist. This has some advantages, like them attending to the sessions so that to not disappoint the physiotherapist. However, it also has some disadvantages, like some inpatients also “using” that emotional bond to soften up the physiotherapy sessions, or decreasing the challenge required from them.

In [1], they realized that introducing a piece of technology in the physiotherapy interventions changed the roles of the physiotherapist and the behavior of the inpatients in an interesting way: the technology became “the bad cop” whilst the physiotherapist and the inpatient joint forces to “beat the system”.

The goal of our project is to research different settings with different configurations in terms of roles, responsibilities, and capabilities of “the players” on the scene: physiotherapist, inpatients, and technology. Specific goals are:

1) To reduce the physiotherapist’s workload: currently the physiotherapist struggles with modeling movements for the inpatients, explaining the technique of the movements, taking notes about the inpatients performance, mobilizing the inpatients… The technology will take over some of these roles releasing the physiotherapist from them.

2) To reinforce the physiotherapist-inpatient relationship: some of these roles have negative emotional effects, like judging when giving the thumbs down to some of the inpatients’ movements. We will use the technology to take over these kinds of roles, and we will encourage the physiotherapist ‘take sides’ with the inpatients by fostering a more pedagogic attitude (e.g. by explaining the inpatients why the system judges them in a certain way).

3) To explore the potential of the technology in improving the physiotherapy practice by adding up to the physiotherapist notes of the sessions. E.g. we expect to be able to record the data from the inpatient’s performances, useful in future sessions or as medical records.

4) To stimulate the inpatient’s motivation to attend to the appointments.

II. THE SYSTEM

This demo will require a Kinect from Microsoft, the humanoid robot NAO from Aldebaran, a Wi-Fi router and Windows PC to coordinate all of them.

The system will model the movements for the inpatients and analyze their movements so that to provide feedback on their performance. The NAO will provide feedback to the inpatients when they perform a wrong movement, or a movement with a wrong technique. The system will be able to recognize the most typical errors that the inpatients tend to do (previously specified by the physiotherapist). When a wrong movement is recognized, the NAO will turn its eyes red, and perform an exaggeration of the wrong movement. After few repetitions of that movement, the NAO will come back to perform the correct movement.

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REFERENCES