Interactive architecture for a web based platform for Apraxia and Action Disorganisation Syndrome rehabilitation

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Abstract—This paper describes the design of an interactive architecture of a web based Personal Healthcare System for cognitive rehabilitation which will be affordable, customizable and capable of delivering continuous, cognitive rehabilitation at home.

I. INTRODUCTION

Following a stroke incident, a significant proportion of patients can suffer from Apraxia or Action Disorganisation Syndrome (AADS) which, among other symptoms, are demonstrated by the impairment of cognitive abilities to carry out activities of daily living (ADL) [1][2].

To date, most common rehabilitation systems that are based on Information and Communication Technologies (ICT) focus on treating physiological symptoms of stroke. These systems are inappropriate for rehabilitation of cognitive impairments. As a consequence, this affects the continuity of therapy and weakens its impact.

II. COGWATCH OVERALL ARCHITECTURE

CogWatch is a Personal Healthcare System that aims at providing customized and affordable cognitive rehabilitation to stroke patients with Apraxia and AADS in a non-clinically environment. It will allow long-term rehabilitation of the cognitive aspects of ADL tasks.

CogWatch will use sensors embedded in everyday objects (e.g., cutlery, plates, toaster, kettle) to acquire multi-parametric behavioral and physiological information. These data will be analyzed by ad hoc developed algorithms, able to identify and predict the errors (e.g. omission, perplexity, toying…) made during the task execution. Action prediction algorithms will be able to provide multimodal feedback through speakers, vibro – tactile actuators and visual displays. This feedback will guide patients’ actions to accomplish the task, making patients aware of errors and correcting them. The processed results will be available by remote access for cognitive and physiological assessment and telemonitoring by medical and healthcare professionals.

The CogWatch System will be composed of two main subsystems, the CogWatch Client sub-system (CCS) and the CogWatch Server sub-system (CSS). The CCS will be located at the patients’ home, and will be used for collection and analysis of the data acquired during the rehabilitation sessions scheduled by health professionals. The CSS subsystem is the remote point of the system architecture that manages all patient information from all active CCS and presents the results of the rehabilitation sessions to healthcare personnel.

III. CONCLUSION

The CogWatch system is expected to improve the common rehabilitation techniques, providing an innovative ICT system for the cognitive rehabilitation and allowing the remote follow up of post-stroke patients performing rehabilitation sessions in a home-based environment, leading to increased independence of the patient and reduced hospital visits. It is expected that the system will allow remote supervision by health professionals, which in turn may help limit the increasing cost of stroke services in Europe.

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REFERENCES