Physical rehabilitation assessment based on smart training equipment and mobile APPs

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Abstract:
The access to patient-related information during decision-making and the information provided by training equipment, in the present, are still limited that made the objective evaluation of physical rehabilitation effectiveness a difficult task. The paper focuses on smart training equipment, expressed by smart walkers and crutches, for physical therapy monitoring. The used interfaces for visualization of the signals delivered by the measurement channels embedded on the level of training equipment are expressed by mobile devices and appropriate software applications (APPs). The implemented software applications provide appropriate information for physiotherapist about the personal health record and metrics associated with the interaction between patient and the instrumented equipment during rehabilitation sessions. Novel sensing solutions expressed by piezo resistive force sensors, MEMS inertial sensors and Doppler radar sensors perform the user assessment during training are also described. The appropriate processing of the data provided by smart objects as part of smart physiotherapy ecosystem permits to extract information about the rehabilitation outcome.

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Contents

Introduction

The latest developments in the field of sensors, embedded computers and wireless communication permit to develop smart devices that that deliver useful information to the health professionals regarding physiotherapy training sessions creating conditions for rehabilitation process optimization according with patient evolution. At the same the improvement of communication between the physiotherapists or between physiotherapist and patient could be improved based on objective data coming from instrumented training equipment, communication failure especially between health professionals being identified as the root cause for nearly 66 percent of all medical errors [1]–[2]. Good therapeutic communication may implies an enhanced ability to obtain valid informed consent, positive clinical outcomes, higher levels of patient satisfaction, higher levels of patient compliance with rehabilitation programs, lower levels of patient frustration/anger [3].