Measurements and sensors for motion tracking in motor rehabilitation

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Abstract:
This paper presents a brief overview of the commercial solutions and the research proposals for measuring the patient's movements, and is organized as follows. In Section 1, a review of laboratory measurement equipment for the patient's mobility evaluation will be described. In Sections 2 and 3, some proposals of portable measurement systems, used to monitor the patient or track his/her progresses during the treatment at home and in clinical environments, are presented and discussed. The measurement methods presented are marker-based motion capture and analysis systems, marker-less motion capture and analysis systems, robot-based and exoskeleton systems, vision systems and virtual reality, and personal motion measurement systems based on sensor networks.

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Laboratory Equipment

Laboratory equipment for measuring human motion is designed to work in a restricted controlled environment; however, it needs to track specific points of the human body with high accuracy. Such equipment mostly relies on capturing the motion of different body segments using cameras. Identifying body segments to track can be done following two methods, depending on whether it is based on markers or not. The following sub-sections will discuss the two approaches. Fig. 1.

(a) An example of passive markers. (b) and (c) Their appearance on the acquired images from two different infrared cameras. Used with permission [8]

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