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Proprioceptive Neuromuscular Facilitation Exercises of Upper Extremities Assessment Using Microsoft Kinect Sensor and Color Marker in a Virtual Reality Environment

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Abstract : Proprioceptive neuromuscular facilitation exercises are a series of stretching techniques that are commonly used in rehabilitation and exercise therapy. Assessment of these exercises for true maneuvering requires extensive experience in this field and could not be down with patients themselves. In this paper, we developed software that uses Microsoft Kinect sensor, a spherical color marker, and real-time image processing methods to evaluate patient’s performance in generating true patterns of movements. The software also provides the patient with a visual feedback by showing his/her avatar in a Virtual Reality environment along with the correct path of moving hand, wrist and marker. Primary results during PNF exercise therapy of a patient in a room environment shows the ability of the system to identify any deviation of maneuvering path and direction of the hand from the one that has been performed by an expert physician.

Keywords : image processing, Microsoft Kinect, proprioceptive neuromuscular facilitation, upper extremities assessment, virtual reality
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