



Implementation of Remote Access Capability for an Upper Limb Exoskeleton Rehabilitation Robot

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Abstract

Physical Rehabilitation involves restoring or improving motor functions through targeted exercises. It is mostly carried out in person by well-trained therapists. However, in the recent past, robot devices have been increasingly used in patient rehabilitation. The rapid technological development in relation to these robots has significantly improved rehabilitation procedures. The advent of telerehabilitation techniques offers greater flexibility and broader accessibility for physiotherapy and rehabilitation. Robot-based telerehabilitation demands effective communication between the therapist, the patient, and the robot. Although there is an ample amount of work on telerehabilitation, no research study is available on the implementation aspects of making the robot remotely accessible to the therapist. In this work, we focus on developing a web application and mobile application which can assist with the control of a rehabilitation robot from a remote location and a two-way video communication system for better communication between the therapist and the patient. Further, a web-based management system is implemented to authenticate the users and to store the important parameters of each exercise (rehabilitation) session, such as therapy duration, movement angles, and speed, to visualize and assess the progress. In addition, features, such as heart rate monitoring, and voice and gesture control, are also added to improve the accessibility of the robot and the safety of the patients. This work is implemented on top of a rehabilitation robot, namely "Rehabot", which is an upper limb rehabilitation robot that the authors have previously designed and implemented.

Keywords: Exoskeleton, Gesture Recognition, Rehabilitation, Remote Access, Video Conferencing.

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