

Title: A Bi-Manual Evaluation Setup for Upper Limb Prostheses in Real-Life Settings
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Abstract

Research on myoelectric control for upper-limb prostheses often fails to transfer from the laboratory to the everyday life of amputees. Among the causes for this difficult transition is that clinical short-term evaluations do not sufficiently reflect the performance during subsequent real world use. To bridge this gap, we propose an evaluation setup for upper-limb myoelectric prostheses for intact subjects, consisting of sEMG sensors, two state-of-the-art commercial hand prostheses (left and right) and a bi-manual evaluation protocol that is executed in a domestic setting. Orthotic splints are used to fix the prosthetic hands via a standard quick-release unit at the extremity of the arms or stumps. This makes the method suited for both able-bodied as well as amputated subjects and it prevents unilateral amputees from using the intact limb to compensate for a lack in dexterity of their prosthetic hand. The evaluation protocol requires users to perform everyday bilateral manipulation tasks in different areas of their reachable workspace. Specifically, subjects must, e.g., make a phone call, unscrew a jar lid, pick up objects from shelves at different heights, fold clothes, and clean the floor (Figure 1). Furthermore, our myoelectric setup can also be used in virtual reality with simulated prostheses. This allows fast prototyping of new prosthetic hands, novel tasks, as well as new environments that simulate a wide variety of possible use-cases of end-users.



Figure 1: Examples of the bimanual manipulation tasks defined in the evaluation protocol.

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References

<https://www.youtube.com/watch?v=y6uI5FLB9Q4>

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