Fitts' Law Evaluation of a Passive Rotation Paradigm for Two-Dimensional Cursor Control with a Single sEMG Signal

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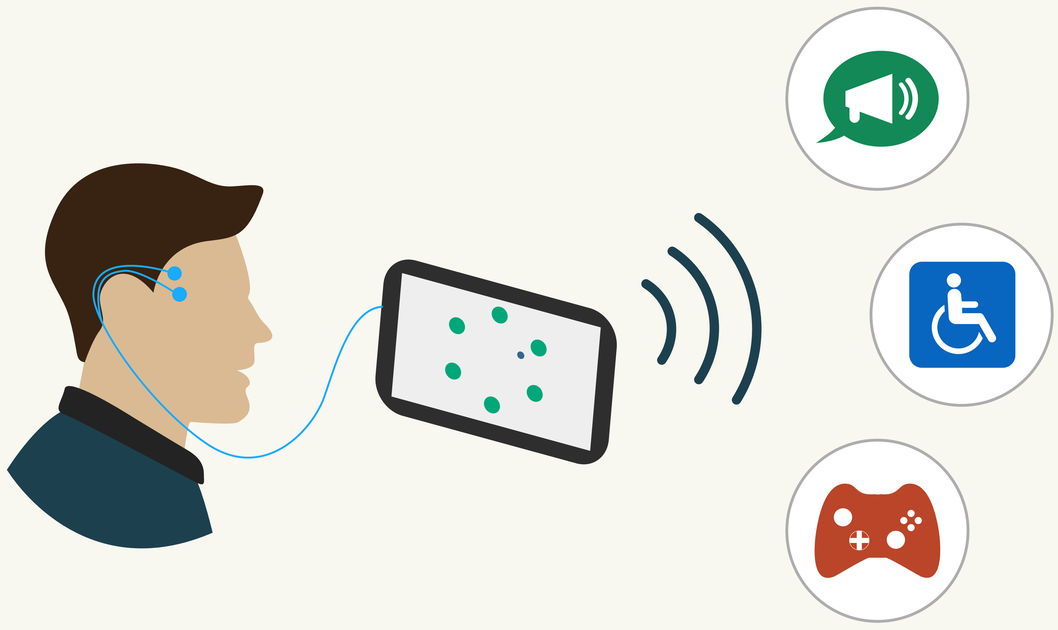
Motivation

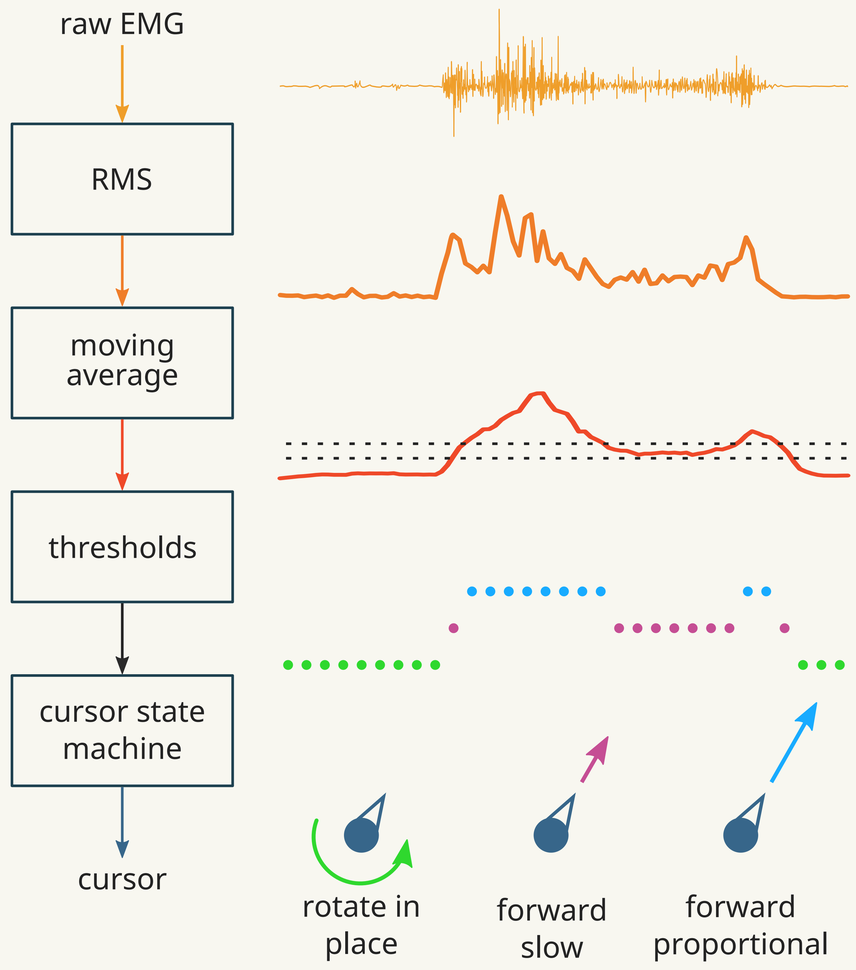
We aim to develop a **noninvasive** and **minimally intrusive** human-computer interface (HCI) for people affected by disabilities such as spinal cord injury and spinal muscular atrophy.

Control of a computer cursor may allow these individuals to interact with their environment in various ways.



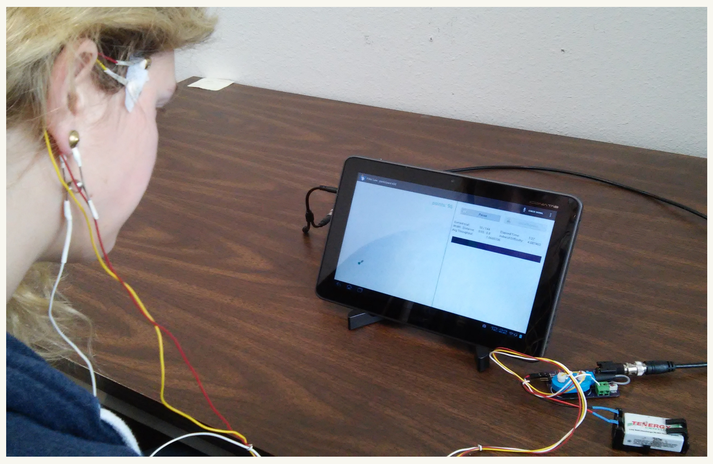
EMG Controller

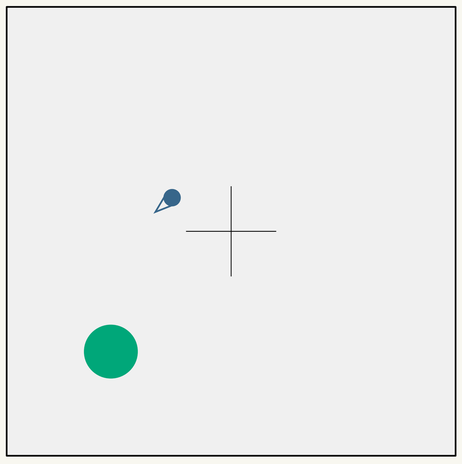
A single surface EMG signal is used to control the cursor in two dimensions. This is achieved by passively rotating the cursor while the user relaxes (small EMG signal), and moving the cursor forward when the user initiates a contraction.



Experiment

Four able-bodied subjects participated in the experiment, using the temporal muscle to reach targets of various sizes and distances in a center-out task.

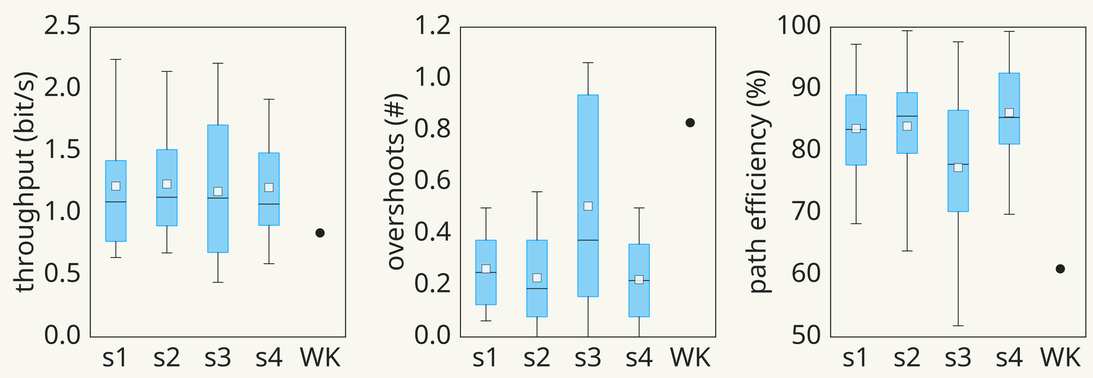




Results

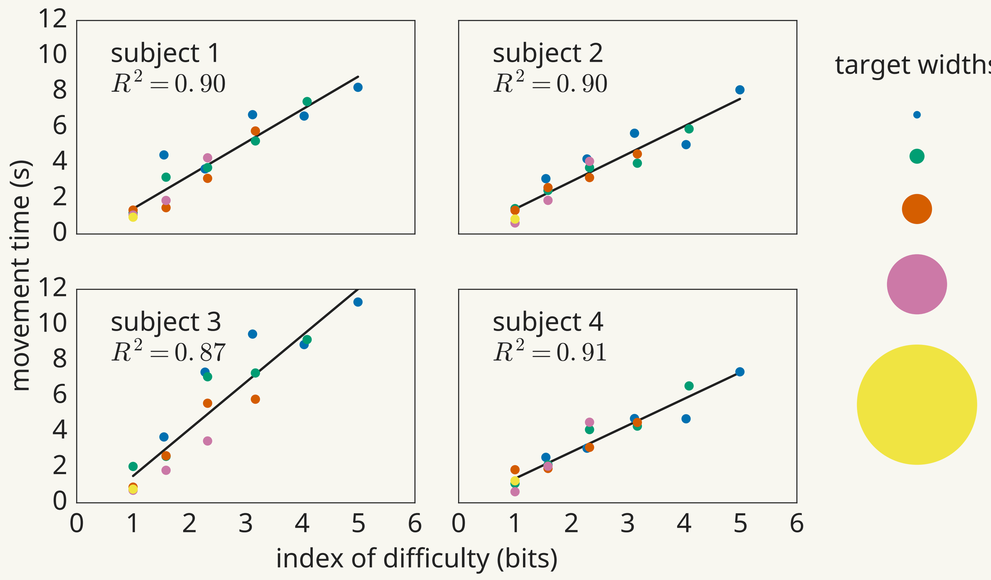
Overall Performance

All four subjects achieved a throughput above 1 bit/s, despite having only one sensor. This compares favorably to similar studies which rely on more sensors for 2D control (e.g. Williams and Kirsch, 2008).



Fitts' Law

Fitts' Law predicts a linear relationship between movement time and index of difficulty, which each subject demonstrated.



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