Assistive Environmental Control BCI for Late-Stage ALS Patients

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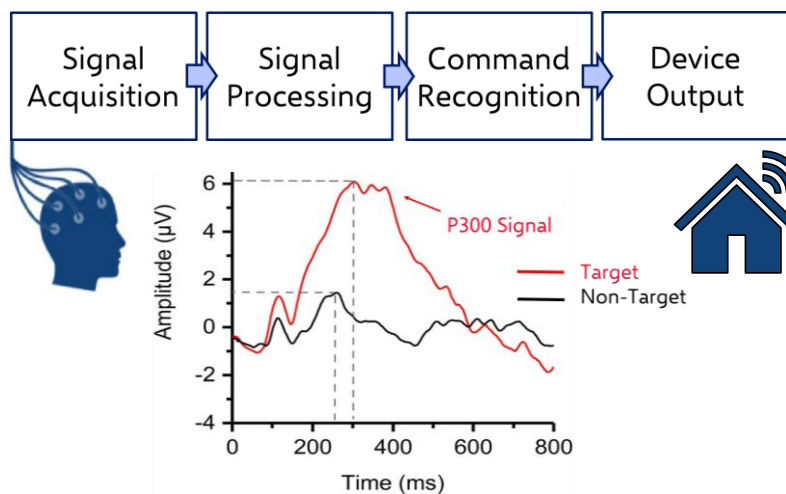References and Demo Video

NEED

Amyotrophic Lateral Sclerosis (ALS) is a neurodegenerative disease resulting in loss of muscle control, or locked-in syndrome. Existing assistive technology solutions are not well suited for patients.

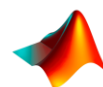## OBJECTIVE

Design a customizable brain-computer interface (BCI) that enables users to execute environmental controls

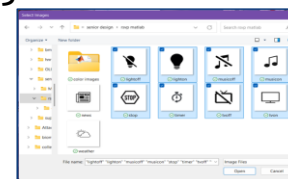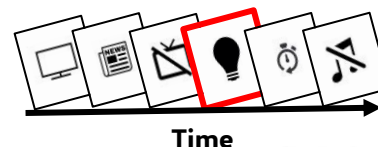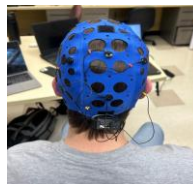
SOLUTION

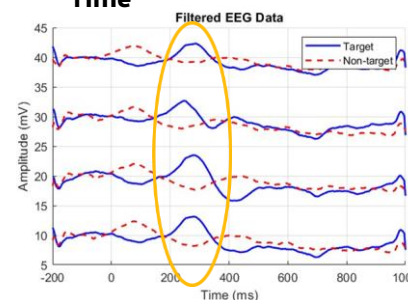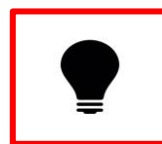I. Caregiver can customize the BCI to better fit patient needs by selecting relevant commands

II. ALS patient equipped with EEG cap and views RSVP sequence

Time

III. EEG signals filtered and processed in real-time for P300 signal

IV. Selection identified and transmitted to home assistant

VERIFICATION

TEST	TARGET	RESULT
Icon Inter-changeability	Reflected in randomized order	PASS
Selection Speed	≤ 45 sec	PASS
Selection Accuracy	≥ 70%	FAIL
Command Execution	Home assistant completes command	PASS

CONCLUSION

Future Work ...
(1) Adjust time synchronization to improve system accuracy (2) complete single application (3) more robust home assistant connection

Impact
This BCI offers a solution for restoring autonomy of locked-in ALS patients and will open the door to more personalized assistive technology with flexible capabilities.