



Mental Drive

A Motor Imagery EEG-based Game using Emotiv EPOC+

Student: Sim Tong Gerald

Supervisor: Dr Smitha K G

Motor Imagery neurorehabilitation has been touted as a breakthrough treatment to facilitate neurogenesis in the early stages after stroke onset by *imagining* movements on stroke affected limbs to facilitate the reconstruction of neural pathways. However, applications and hardware that provide such treatment are very expensive and not viable for home and community use.



Mental Drive is a simple infinite runner-style game that uses intended movement mental commands classified through the lower-cost Emotiv EPOC+ headset to provide active control of the game. Collect the capsules, don't crash!



A



B

Two experiments were conducted with eight participants wearing the headset in position A and position B. Participants included healthy adults and stroke patients.

Participant	Position A Accuracy	Position B Accuracy
A	52.31%	52.11%
B	55.12%	67.28%
C	54.10%	67.28%
D	57.32%	64.33%
E	57.77%	57.30%
F	55.64%	60.77%
G	55.59%	70.20%
H	79.65%	74.88%

Based on a overall sample size of 400 gameplay attempts, position B was seen to have provided a higher in-game classification accuracy.



The results show that low-cost EEG headsets such as an Emotiv EPOC+ is a viable alternative to expensive EEG devices to provide motor imagery-based neurorehabilitation. Future EEG-based neurorehabilitation solutions may consider low-cost devices such as the Emotiv EPOC+ to bring advanced stroke recovery treatments to homes and the community.