NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

School of Computer Science and Engineering
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Investigating EEG Correlates of Limb Motor Activity II

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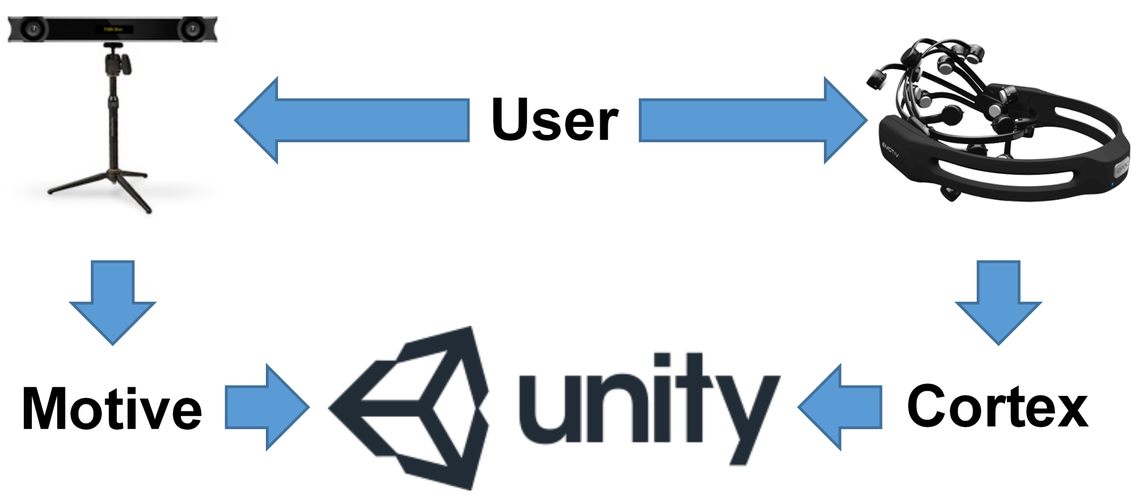
Introduction

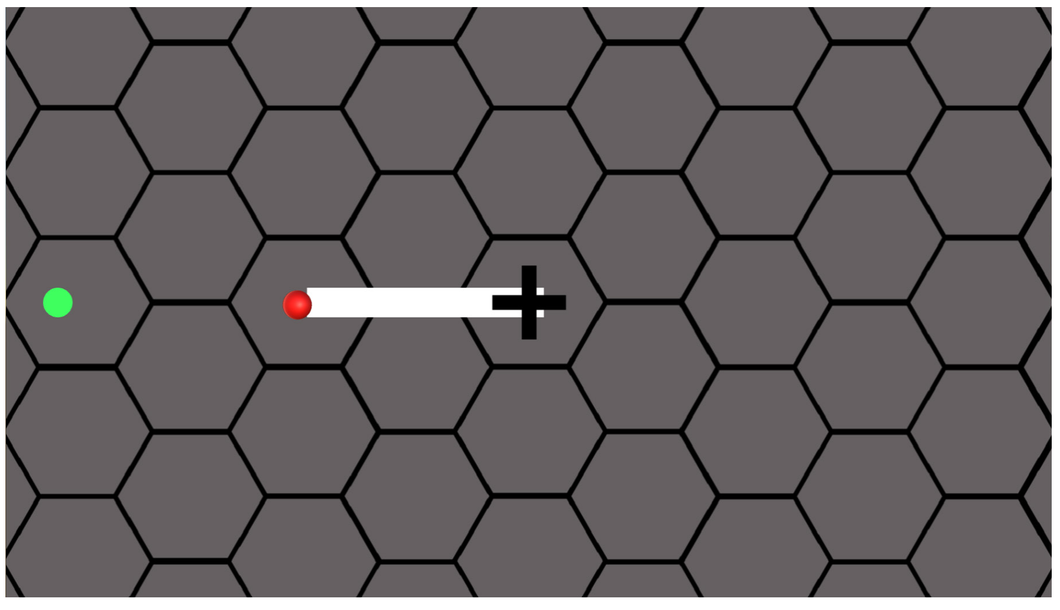
In this project, the correlation between limb motion and brain activity was studied. The first objective of this project was to develop a system that simultaneously records mocap (motion capture) data and EEG (electroencephalography) data from users was developed. The second objective of this project was to perform correlation analysis through classification and regression on the collected mocap data and EEG data.

System Development

A Unity application that integrates the OptiTrack V120:Duo motion tracking system and Emotiv EPOC+ EEG headset was developed. OptiTrack's optical motion capture software Motive was used to integrate the V120:Duo with Unity. Emotiv's Cortex API was used to integrate the EPOC+ with Unity.



The application records mocap data and EEG data from users while they were engaged in a game. In the game, users used a player-controlled ball to following a line growing to the left or right. The speed at which the line grows varies as well.



Experiment

6 subjects participated in the experiment and left-fast, left-slow, right-fast and right-slow mocap data with the corresponding EEG data were collected from them.

Correlation Analysis

EEG data was classified into different speeds and directions based on the limb motion of the user.

Subject	Accuracy (%) When Classifying Trial Type			
	Fast	Slow	Left	Right
1	80.0	80.0	85.0	80.0
2	50.0	75.0	100.0	95.0
3	85.0	80.0	80.0	95.0
4	85.0	80.0	85.0	90.0
5	90.0	45.0	70.0	95.0
6	80.0	60.0	100.0	95.0
Mean	78.0	70.0	87.0	92.0
SD	14.4	14.5	11.7	6.1

EEG data was also used to estimate mocap data through regression. Both classification and regression used feature selection to maximise accuracy and minimise RMSE.