UNIVERSITY OF SOUTH FLORIDA

Defense of a Master's Thesis

Adaptive Mobile EEG Noise Cancellation Using 2D Convolutional Autoencoders for BCI Authentication

by

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Electroencephalography (EEG) signals can be used for many purposes and has the potential to be adapted to various systems. When EEG is recorded from users, these studies are performed primarily in an indoor environment, while th user is stationary. This is due to the levels of noise that are experienced when recording EEG data, to minimize erro in the data. This thesis aims to adapt tasks that are performed indoors to an external environment by removing the noi in EEG, using a 2D Convolutional Autoencoder (CAE). The data is recorded from subjects during testing and is passe into the 2D CAE to produce a reconstructed signal that will have the noise removed. The experiment consists of a initial recording, where the subject sits stationary indoors for 60 seconds, to obtain a baseline. Afterwards, they perform movement-based tasks both indoors and outdoors for 60 seconds. The indoor movement recordings are used as the pu signals and the outdoor recordings are the noisy signals. Both are passed into the 2D CAE to produce a reconstruc