Our brain controls the processes of the body including movement. In this thesis, we try to understand how the information about hand movement is encoded into the brain's electrical activity and how this activity can be used to predict the velocity and absolute velocity of hand movements. Using a well-established deep neural network architecture for EEG decoding - the Deep4Net - we predict hand movement velocity and absolute velocity from intracranial EEG signals. While reaching the expected performance level, we determine the influence of different frequency bands on the network's prediction. We find that modulations in the high-gamma frequency band are less informative than expected based on previous studies. We also identify two architectural modifications which lead to higher performances. 1. the removal of max-pooling layers in the architecture leads to significantly higher correlations. 2. the non-uniform receptive field of the network is a potential drawback making the network biased towards less relevant information.