The requirement of calibration stage especially for cross-subject EEG signals for SSVEP-based BCI application.

Approach:

Generate realistic synthetic EEG signals that eliminate subject-specific features to boost SSVEP classification performance for unseen subject via Subject Invariant SSVEP GAN (SIS-GAN).

The subject invariant loss component:

$$L_S = \arg \max g S_g(x)$$

The overall training objective:

$$L = L_D + \lambda_a L_A + \lambda_s L_S$$

Conclusion:

- successfully generate new synthetic SSVEP-based dry-EEG signals via SIS-GAN
- creation of subject-invariant data removing subject-specific features whilst preserving the SSVEP frequencies
- improvement of unseen subjects generalisation when performing zero-calibration classification by training only on synthetic signals.