

Claims:

1. A computer system for acquiring a control command, the system including one or more processors in communication with non-transitory data storage media having instructions stored thereon that, when executed by the one or more processors configure the one or more processors to perform the steps of:

receiving, at an electroencephalogram (EEG) receiver, baseline EEG data; acquiring, using a normalisation module, one or more normalisation factors from the baseline EEG data; receiving, at the EEG receiver, stimulated EEG data sensed by one or more EEG sensors;

correlating the stimulated EEG data across the one or more EEG sensors, using a correlation module, to generate one or more correlation coefficients corresponding to one or more stimulation frequencies, each of the one or more stimulation frequencies corresponding to a respective candidate control command; applying the one or more normalisation factors to the one or more correlation coefficients to produce one or more flattened correlation coefficients;

identifying, from the one or more stimulation frequencies and using the one or more processors, a control stimulation frequency based on the one or more flattened correlation coefficients; and

acquiring, using a control command identification module, the control command by determining which said candidate control command corresponds to the control stimulation frequency.

2. The computer system according to claim 1, wherein each normalisation factor of the one or more normalisation factors corresponds to a respective reference signal, wherein the normalisation module acquires the one or more normalisation factors by comparing the baseline EEG data to the respective reference signal.

3. The computer system according to claim 2, wherein each reference signal corresponds to a said candidate control command.

4. The computer system according to claim 2, wherein the normalisation module acquires the one or more normalisation factors by determining one or more baseline correlation coefficients each corresponding to a respective one of the one or more reference signals.

5. The computer system according to claim 4, wherein the normalisation module acquires each normalisation factor by calculating the respective normalisation factor according to the equation:

$$\lambda_i = \frac{\frac{1}{n} \sum_{j=1}^n \hat{r}_j}{\hat{r}_i}$$

where λ_i is the normalisation factor for reference signal i , n is the number of stimuli frequencies, and $\hat{r}_i$ is the baseline correlation coefficient for reference signal i .

6. The computer system according to claim 2, wherein each said stimulation frequency corresponds to a said respective reference signal and thereby to the normalisation factor and flattened correlation coefficient corresponding to the respective reference signal.

7. The computer system according to claim 6, wherein the one or more processors identify the control stimulation frequency as being the stimulation frequency with a maximum flattened correlation coefficient.

8. The computer system according to claim 2, further comprising a reference signal generation module for generating the one or more reference signals to include a plurality of phase-shifted signals for at least one of the one or more stimulation frequencies.

9. The computer system according to claim 8, wherein the one or more reference signals include a plurality of phase-shifted signals for each stimulation frequency of the one or more stimulation frequencies.

10. The computer system according to claim 1, further comprising a command execution module for executing the control command to generate an output in a controllable system.

11. A computer process for acquiring a control command, comprising: receiving baseline electroencephalogram (EEG) data; acquiring one or more normalisation factors from the baseline EEG data; receiving stimulated EEG data sensed by one or more EEG sensors;

correlating the normalised EEG data across the one or more EEG sensors to generate one or more correlation coefficients corresponding to one or more stimulation frequencies, each of the one or more stimulation frequencies corresponding to a respective candidate control command;

applying the one or more normalisation factors to the one or more correlation coefficients to produce one or more flattened correlation coefficients;

identifying, from the one or more stimulation frequencies, a control stimulation frequency based on the one or more flattened correlation coefficients; and

acquiring the control command by determining which said candidate control command corresponds to the control stimulation frequency.

12. The computer process according to claim 11, wherein each normalisation factor of the one or more normalisation factors corresponds to a respective reference signal, and acquiring the one or more normalisation factors comprises comparing the baseline EEG data to the respective reference signal.

13. The computer process according to claim 12, wherein each reference signal corresponds to a said candidate control command.

14. The computer process according to claim 12, wherein acquiring the one or more normalisation factors further comprises determining one or more baseline correlation coefficients each corresponding to a respective one of the one or more reference signals.

15. A computer process according to claim 14, wherein acquiring each normalisation factor comprises calculating the said normalisation factor according to the equation:

$$\lambda_i = \frac{\frac{1}{n} \sum_{j=1}^n \hat{r}_j}{\hat{r}_i}$$

where λ_i is the normalisation factor for reference signal i , n is the number of stimuli frequencies, and $\hat{r}_i$ is the baseline correlation coefficient for reference signal i .

16. The computer process according to claim 12, wherein each said stimulation frequency corresponds to a said respective reference signal and thereby to the normalisation factor and flattened correlation coefficient corresponding to the respective reference signal.
17. The computer process according to claim 16, wherein the control stimulation frequency is the stimulation frequency with a maximum flattened correlation coefficient.
18. The computer process according to claim 12, wherein the one or more reference signals include a plurality of phase-shifted signals for at least one, and preferably each, of the one or more stimulation frequencies.
19. The computer process according to claim 11, further comprising executing the control command to generate an output in a controllable system.
20. A computer process for generating a control command, comprising:
 - receiving stimulated EEG data sensed by one or more EEG sensors;
 - correlating the stimulated EEG data across the one or more EEG sensors using, for one or more stimulation frequencies, a plurality of phase-shifted signals of the stimulation frequency, to generate one or more correlation coefficients corresponding to the one or more stimulation frequencies, each of the one or more stimulation frequencies corresponding to a respective candidate control command;
 - identifying, from the one or more stimulation frequencies, a control stimulation frequency based on the one or more correlation coefficients; and
 - acquiring the control command by determining which said candidate control command corresponds to the stimulation frequency with the maximum correlation coefficient.