ANALYSIS OF EMG SIGNAL USING PYTHON

INTRODUCTION:

EMG signals are the smallest functional unit that describes how a muscle contracts is the motor unit. The motor unit consists of the cell body and axon of a motor neuron and the muscle fibres it innervates. This motor unit generate EMG signals that control it. This signal is emulated using Python programming and is analysed by filtering it and seeing it performance.

AIM:

To generate and analyse EMG signal using Python programming language. The EMG signal is simulated via coding and is analysed by filtering it and seeing it performance.

INPUT:

Time, emg, low\_pass, sfreq, high\_band, low\_band.

FUNCTIONS USED:

Functions:

1. uniform() - To generate bust and quiet times for the emg signal.
2. concatenate() - To club burst and quiet signals to form one emg signal.
3. array() - To sample emg signal at a given rate.
4. Butter() - To filter signal to a desired band.
5. filtfilt() - To process the filtered signal.
6. Plot() - To plot the generated and filtered signal.

User defined function:

1. generateemg() - To generate emg signal from inbuilt functions.
2. filteremg() - To filter emg signal to a said band and process it.

OUTPUT:

1. Emg signal
2. Filtered emg signal

PSEUDO CODE:

1. To import necessary packages for python EMG simulation.
2. To generate Bust signals using np.random.uniform() function.
3. To generate Quiet signal using np.random.uniform() function.
4. Using np.concatenate() functions, these Burst and Quiet signals are combined to get EMG signal.
5. Using np.array() function, the EMG signal is sampled at a given rate.
6. Using Plot() function, the EMG signal is plotted.
7. In filtering phase, Creating a function filtereemg() that takes inputs such as time, emg, sfreq, high\_band, low\_band.
8. Using this parameters, the normalized cutoff frequencies are calculated.
9. Using Butter() function to filter the EMG signal using a band pass filter design.
10. Using filtfilt() function the filtered signal is processed and is rectified using abs() function.
11. This filtered signal is then plotted using Plot() and Subplot() function.