Abstract

In the presented work, a robotic arm is controlled using the EMG signal acquired from the electrodes attached to the human arm. The EMG signals are acquired from three different muscle groups of the upper forearm. The EMG signal is very noisy and of the order of microvolts. Faithful extraction of the EMG signal is the prime objective in the presented work. The acquired signal is then fed to signal conditioning unit consisting of signal acquisition, amplification, rectification and final filtration. The output of the signal conditioning unit is then converted to digital signal using a 16-bit serial ADC. The digitized signal is used as feedback and control signal for final control of the robotic arm. The robotic arm is attached to the shaft of the stepper motor for motion. Stepper motor is interfaced using microcontroller. There may be more than one stepper motor to give multi-dimensional motion to robotic arm. It can be assumed that with one single stepper motor, ideally we can have \( \frac{360}{\theta} \) no. of positions (\( \theta \) being the step angle). Presently we have used only two stepper motors for up-down motion at two joints thereby enabling to give \( (\frac{360}{\theta})^2 \) no. of positions.
- Differential operational amplifier INA106, datasheet.
- Operational amplifier TL072, datasheet.
- ADC LTC-1867, datasheet.
- Society of Robots tutorials.

Index Terms

Computer Science
Automation

Keywords

SCU? Signal Conditioning Unit  ADC? Analog to Digital Converter  EMG? Electromyography

Amplification

Degrees of Freedom

Stepper Motors

Control Algorithm