

ABSTRACT

Utilization of Myoelectric Signal on Muscle Contraction Process as Trigger for Actuator Motor Movement (Beginning of Myoelectric Artificial Hand Engineering)

The prosthesis utilization is an alternative way that many people took to overcome handicap due to the loss of extremity during accident or any other cause. Specially for artificial hand, myoelectric artificial hand type can be functionally desirably, so it has become common interest. In Indonesia this kind of prosthesis is still rare and very expensive (import dependent). Beside of its expensive cost, the preparation cost (fitting and exercise) for its user is also quite expensive. The alternative way to suppress its cost is to provide some specification product that can be chosen as needed. Correlation between myoelectric signal (MES), hand grip, and body fat percentage are believe to be useful as foundation to determine specification product of artificial hand, which is physically measure of myoelectric artificial hand and power amplification of needed MES input. From the literature study that had been performed (specially about MES), both seizing mechanism and processing myoelectric signal, or information about correlations between MES, hands grip, and body fat percentage are still unclear.

The objective of this research is to build a MES processing device as an initial engineering for myoelectric artificial hand product, and also to seek correlation between MES, grip strength, and body fat percentage. So the hypothesis of this research is that the processing MES device from the mechanism of muscle contraction can be built using surface electrode without external electrical stimulator, and there are significant correlation between MES, body fat percentage, and grip strength.

By using surface electrode, this device has to be able to seize MES beneath skin surface (as reference) ranging from 30-40 mVolt, be able to filter MES out from noise (from 220 Volt/50 Hz network), reinforcing input (MES) and calibrating MES to become drawing shape or movement (mechanic). Meanwhile, testing correlation between MES, hand grip, and body fat percentage had been performed using SPSS 14 soft network. Measuring body fat percentage had been performed using skinfold measurement with Brozek Formula.

The result of this research is that MES wave reading can be performed with engineering change MES processing device. Detected MES with 150 times tension reinforcing, range from 0 to 5.63 Volt or the quality of detected MES input range from 0 to 37.53 mVolt. Actuator motor can also spin while muscle contracted, and stop spinning when muscle relaxed. In addition, there are quite significant correlation between MES, grip strength, and body fat percentage. The strongest correlation is between MES and hand grip.

In conclusion, MES processing device from muscle contraction mechanism can be build using surface electrode without external electric stimulator, and there is strong correlation between MES and grip strength, and there is moderate correlation between MES and body fat percentage.

Keywords : artificial hand, myoelectric signal, muscle contraction, hand grip, body fat percentage.