

DEDICATION

*We dedicate this research with much love and
appreciation;*

*To the candles of our lives .our beloved mothers who
have always been there for us.*

*To our fathers who have always been the brick walls on
whom we can learn and depend on forever.*

To our brothers and sisters who mean the world to us.

*To our friends, family, colleagues and teachers in the
past and presents and to everyone that we love.*

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Firstly, thanks to Allah, our creator above for being everything and for giving us the ability and strength to do anything.

*I wish to express my deepest gratitude and appreciation for my supervisor for this research **Dr. Aladdin Awouda** for his patience and continuous guidance, advice and supervision through this work.*

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ABSTRACT

A prosthetic limb is an artificial device extension that replaces a missing body part. A prosthetic arm is a fake arm for those who amputated their arm. In addition to the standard artificial limb for everyday use, many amputees have special limbs and devices to aid in the participation of sports and recreational activities.

Prosthetic arm is a boon for those persons who have lost their arm due to some accident. The main requirement is that its function should be as near to the natural arm as possible. There are various designs of artificial arms that are available in the market, categorized as mechanical, electrical and myoelectric arms. Mechanical arms use some motion of the body to provide the force necessary to control the prosthetic component. Electrical arms operate the hand by a motor which is driven by micro switches and relays. Myoelectric arms are stimulated by muscle signal available from the amputee.

Electromyography (EMG) signal detected by sensors or electrodes. The amplitude of the surface EMG signal (SEMG) is varies range. The rms value for the upper movement of the arm is more than the rms value for the down movement of arm. Similarly, rms value for the clockwise movement of the arm is more than the rms value for the anticlockwise movement of arm. Based on this a microcontroller was programmed to perform up/down and clockwise/anticlockwise movements in steps depending on the dc voltage level. The levels of the dc voltage corresponding to the EMG signal were taken.

المستخلص

الأطراف الاصطناعية هو جهاز اصطناعي يحل محل الجزء المفقود من الجسم. الذراع الاصطناعية هي ذراع وهمية لأولئك الذين بترت أذرعهم. بالإضافة إلى أنه طرف اصطناعي قياسي للاستخدام كل يوم، العديد من مبتوري الأطراف لهم أطراف وأجهزة خاصة للمساعدة في مشاركة الأنشطة الرياضية والترفيهية.

الذراع الاصطناعية هو هدية لأولئك الأشخاص الذين فقدوا ذراعهم بسبب بعض الحوادث. الشرط الرئيسي لهذه الأطراف هو أن وظيفتها يجب أن تكون بالقرب من الذراع الطبيعية بقدر الإمكان. هناك تصاميم مختلفة للذراع الاصطناعية صُنفت إلى كهربائية وميكانيكية وكهربية العضل (myoelectric). الأطراف الاصطناعية الميكانيكية تستخدم بعض الحركة من الجسم لتوفير القوة اللازمة للسيطرة على المكون الاصطناعي. الأطراف الكهربائية تعمل بواسطة محرك تقوم بتحريكه مفاتيح صغيرة والتبديلات. أما الذراع الكهربائية العضل يتم تحفيزها بواسطة إشارة العضلات المتاحة من مبتوري الأطراف.

إشارة الـ (EMG) يتم الكشف عنها بواسطة الحساسات أو الأقطاب ، ولها إتساع ذو مدى متغير. إن قيمة الجذر التربيعي لحركة الذراع لإعلى لها قيمة أكبر من قيمة الجذر التربيعي لحركة الذراع إلى أسفل. وبالمثل أن قيمة الجذر التربيعي لحركة الذراع مع عقارب الساعة أكبر من قيمة الجذر التربيعي لحركة الذراع عكس اتجاه عقارب الساعة. وبناء على هذا يمكن برمجة المايكروكونترولر لأداء حركات أعلى أو أسفل وحركات مع عقارب الساعة أو عكس إتجاه عقارب الساعة اعتماداً على مستويات (قيم) الجهد المستمر. هذه المستويات تماثل إشارة EMG

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List of Abbreviations

EMG	Electromyogram
UC	University of California
DSP	Digital Signal Processor
DC	Direct Current
RMS	Root Mean Square
DOF	Degree Of Freedom
ADC	Analog to Digital Converter
RAM	Random Access Memory
ROM	Read Only Memory
EEPROM Memory	Electrical Erase Programmable Read Only
PWM	Pulse Width Modulation
LSB	Least Significant Bit
VREF	Reference Voltage
CPU	Central Processing Unit
IC	Integration Circuit
PLC	Program Logic Controller
TTL	Transistor-Transistor Logic
PCB	Printed Circuit Board
LCD	Liquid Crystal Display