

**CARBON NANOTUBE-COATED COTTON THREAD AS
MECHANOMYOGRAPHY SENSOR DURING HAND MUSCLE
CONTRACTION**

By

Deby Erina Parung
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SWISS GERMAN UNIVERSITY


SWISS GERMAN UNIVERSITY
The Prominence Tower
Jalan Jalur Sutera Barat No. 15, Alam Sutera
Tangerang, Banten 15143 - Indonesia

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STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.

Deby Erina Parung

Student

Date

Approved by:

Dr. Dedy H B Wicaksono, PhD

Thesis Advisor

Date

Fuad Ughi, M.T.

Thesis Co-Advisor

Date

Dr. Dipl-Ing. Samuel P. Kusumocahyo

Dean

Date

Deby Erina Parung

ABSTRACT

CARBON NANOTUBE COATED COTTON THREAD AS MECHANOMYOGRAPHY SENSOR DURING HAND MUSCLE CONTRACTION

By

Deby Erina Parung
Dr. Dedy H B Wicaksono, PhD, Advisor
Fuad Ughi, M.T., Co-Advisor

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The study aimed to create a reliable wearable strain gauge sensor suited for a mechanomyography measurement of 2 arm muscles. The mechanomyography was developed to act as a complementary means of muscle activation measurement to electromyography. The sensor for the mechanomyography was a thread sensor made of cotton thread dipped in a multi walled carbon nanotubes dispersion. The fabricated sensor has a negative gauge factor, which means the resistance decreases as it is given strain. The sensor then sewn on an arm sleeve to conform to the subject's arm. The best sewing pattern for the sensor is 1 cm of length with 3 meanders, which produces the highest sensitivity at -1.47 of gauge factor. The sensor then connected to a voltage divider to translate the resistance change to a voltage signal, then converted to force change. The final setup for the device utilized two different sensors to simultaneously read the *biceps* and the *triceps brachii*. The device then tested on 5 male subjects, falling between the inclusion group. The developed mechanomyography was able to plot the activation of the both muscles.

Keywords: mechanomyography, electromyography, strain gauge, gauge factor.



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DEDICATION

I dedicate this work to my beloved family, friends, and country.



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TABLE OF CONTENTS

	Page
STATEMENT BY THE AUTHOR.....	2
ABSTRACT.....	3
DEDICATION.....	5
ACKNOWLEDGEMENTS.....	6
TABLE OF CONTENTS.....	7
LIST OF FIGURES.....	11
LIST OF TABLES.....	13
CHAPTER 1 - INTRODUCTION.....	14
1.1 Background.....	14
1.2 Research Problem.....	15
1.3 Research Objectives.....	15
1.4 Significance of Study.....	15
1.5 Research Questions.....	16
1.6 Hypothesis.....	16
CHAPTER 2 - LITERATURE REVIEW.....	17
2.1 Stroke.....	17
2.2 Electromyography.....	18
2.3 Mechanomyography.....	19
2.4 Carbon Nanotubes.....	20
2.5 Upper Limb Movement.....	21
2.6 Upper Limb Muscles.....	21

2.7 Conclusion	24
CHAPTER 3 – RESEARCH METHODS	25
3.1 Venue and Time	25
3.2 Materials and Equipment	25
3.2.1 Materials	25
3.2.1.1 MWCNT	25
3.2.1.2 Sodium Dodecyl Sulphate.....	25
3.2.1.3 Cotton Thread	25
3.2.1.4 Arm Sleeve.....	26
3.2.2 Hardware.....	27
3.2.2.1 Source Measure Unit Xtralien X100.....	27
3.2.2.2 Sanwa Digital Multi-Meter	27
3.2.2.3 Sparkfun ESP 32	28
3.2.2.4 Suruga Seiki B11 60A	29
3.2.2.5 Connector Pin.....	29
3.2.2.6 Metronome Beats Version 3.10.0	30
3.2.3 Software	30
3.2.3.1 Arduino IDE.....	30
3.2.3.2 Excel PLX-DAQ.....	31
3.2.3.3 Ubidots	31
3.3 Design of Experiment	31
3.3.1 Fabrication of the CNT Thread.....	32
3.3.1.1 High Concentration MWCNT Dispersion Method.....	33
3.3.1.2 Low Concentration MWCNT Dispersion Method Without Additional Kinetic Treatment	33
3.3.1.3 Low Concentration MWCNT Dispersion Method with Additional Kinetic Treatment	34

3.3.2 Characterization of the CNT Thread.....	34
3.3.2.1 Conductivity Measurement.....	34
3.3.2.2 Single Thread Gauge Factor Measurement.....	35
3.3.3 Sensor System Characterization	36
3.3.3.1 Sewn Thread Pattern Optimization	36
3.3.3.2 Durability Test	39
3.3.3.3 MMG Sensor Final Characterization	39
3.3.4 Mechanomyography System.....	40
3.3.4.1 Hardware System	40
3.3.4.2 Software System	42
3.3.4.2.1 Online System.....	42
3.3.4.2.2 Offline System	43
3.3.5 Subject Testing.....	43
3.3.5.1 Ethical Approval	44
3.3.5.2 Inclusion Criteria	44
3.3.5.3 Exclusion Criteria	44
3.3.5.4 Subject Physical Measurement	44
3.3.5.5 Testing Procedure	45

CHAPTER 4 – RESULTS AND DISCUSSIONS.....48

4.1 Fabrication Result	48
4.1.1 High Concentration MWCNT Dispersion Method.....	49
4.1.2 Low Concentration MWCNT Dispersion Method Without Additional Kinetic Treatment	50
4.1.3 Low Concentration MWCNT Dispersion Method with Additional Kinetic Treatment	51
4.2 MMG System.....	55
4.2.1 Sewn Thread Characteristic	55

4.2.2 Durability Test	56
4.2.3 Sewing Pattern Optimization	56
4.2.4 Characterization of the MMG Setup	58
4.3 Subject Testing Result	60
CHAPTER 5 – CONCLUSIONS AND RECOMMENDATIONS	66
5.1 Conclusions	66
5.2 Recommendations	66
GLOSSARY	67
REFERENCES	68
APPENDICES	73
CURRICULUM VITAE	78

