|  |  |
| --- | --- |
| http://sphotos.ak.fbcdn.net/photos-ak-snc1/v2219/119/28/51288393663/n51288393663_1327303_6197.jpg | old_logo_color |

THESIS TITLE IN ALL Capital LETTERS\*\*

By

Student’s Full Name\*\*

A Thesis Submitted to the

Faculty of Engineering at Cairo University

in Partial Fulfillment of the

Requirements for the Degree of

**MASTER OF SCIENCE (or DOCTOR OF PHILOSOPHY)\*\***

**in**

**Dep. Name\*\***

FACULTY OF ENGINEERING, CAIRO UNIVERSITY

GIZA, EGYPT

year

* \*The Student must Return to the Postgraduate Office
* \*\* It must be Bold

THESIS TITLE IN ALL Capital Letters\*\*

By

Student’s Full Name\*\*

A Thesis Submitted to the

Faculty of Engineering at Cairo University

in Partial Fulfillment of the

Requirements for the Degree of

**MASTER OF SCIENCE (or DOCTOR OF PHILOSOPHY)\*\***

in

**Dep. Name\*\***

Under the Supervision of

|  |  |  |
| --- | --- | --- |
| Prof. Dr. First S. Name\*\*  ………………………………. |  | Prof. Dr. S. S. Name\*\*  ………………………………. |
| Professor of <Specialization>  Department Name  Faculty of Engineering, Cairo University |  | Associate Professor  Department Name  Faculty of Engineering, Some University |

|  |
| --- |
| Dr. Third S. Name\*\*  …………………………………… |
| Assistant Professor  Department Name  Faculty of Engineering, Other University |

FACULTY OF ENGINEERING, CAIRO UNIVERSITY

GIZA, EGYPT

Year

* \*The Student must Return to the Postgraduate Office
* \*\* It must be Bold

THESIS TITLE IN ALL Capital Letters\*\*

By

Student’s Full Name\*\*

A Thesis Submitted to the

Faculty of Engineering at Cairo University

in Partial Fulfillment of the

Requirements for the Degree of

**MASTER OF SCIENCE (or DOCTOR OF PHILOSOPHY)\*\***

in

**Dep. Name\*\***

Approved by the

Examining Committee

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Prof. Dr. First E. Name**, Thesis Main Advisor\*\*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Prof. Dr. Second E. Name**, Advisor\*\*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Prof. Dr. Third E. Name**, Internal Examiner\*\*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Prof. Dr. Fourth S. Name**, External Examiner\*\*

* Write his Work & Place

FACULTY OF ENGINEERING, CAIRO UNIVERSITY

GIZA, EGYPT

Year

* \*The Student must Return to the Postgraduate Office
* \*\* It must be Bold

|  |  |
| --- | --- |
| **Engineer’s Name:**  Insert photo here | ………………………… |
| **Date of Birth:** | …./…./…….. |
| **Nationality:** | …………….. |
| **E-mail:** | ………………………… |
| **Phone:** | ………………….. |
| **Address:** | ………………………………. |
| **Registration Date:** | …./…./…….. |
| **Awarding Date:** | …./…./…….. |
| **Degree:** | (Master of Science or Doctor of Philosophy) |
| **Department:** | ………………………………. |
|  |  |
| **Supervisors:** |  |
|  | Prof. …………..  Prof. …………..  Dr. .………….. |
|  |  |
| **Examiners:** |  |
|  | Prof. ………………… (Thesis main advisor) |
|  | Prof. …………………(advisor) |
|  | Prof. …………………(Internal examiner)  Prof. …………………(External examiner) |
| **(Any External Prof Dr. must write his work place)** | |
|  |  |
| **Title of Thesis:** |  |
| ………………………………………………………………………………………………………………………………………………………………………………………… | |
|  |  |
| **Key Words: (must be 5 words only)** | |
| …………..; ………; ………; ………; ……… | |
|  |  |
| **Summary: (not more than 150 word and the summary must be in the same page)** | |
| ………………………………………………………………………………………………………………………………………………………………………………………… | |
| ………………………………………………………………………………………………………………………………………………………………………………………… | |
| ………………………………………………………………………………………………………………………………………………………………………………………… | |
| …………………………………………………………………………………………… | |
|  | |
|  | |
|  | |
|  | |

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Date: ../../…(it’s the date that you handover the thesis)

Signature:

Dedication

You may include this section if you wish to dedicate your thesis to someone.

Acknowledgments

In this section, you may provide acknowledgements to those who gave you support and encouragement to complete your thesis. Acknowledgement of funding from local and international funding agencies must be clearly stated.

Starting from the acknowledgements page, pages are numbered using the Roman numerals i, ii, iii …etc. Starting from Chapter 1, pages must be numbered using Arabic numerals. Page numbers are at the bottom of the page, preferably centered.

Table of Contents[\_Toc324710013](#_Toc324710013)

[List of Tables v](#_Toc324710016)

[List of Figures vi](#_Toc324710017)I

[Nomenclature vii](#_Toc324710018)

[Abstract viii](#_Toc324710019)

[Chapter 1 : Introduction 1](#_Toc324710020)

[1.1. First section **Error! Bookmark not defined.**](#_Toc324710021)

[1.2. Second section **Error! Bookmark not defined.**](#_Toc324710022)

[1.3. Heading level 1 **Error! Bookmark not defined.**](#_Toc324710023)

[1.3.1. Heading level 2 **Error! Bookmark not defined.**](#_Toc324710024)

[1.3.1.1. Heading level 3 **Error! Bookmark not defined.**](#_Toc324710025)

[1.4. Organization of the thesis **Error! Bookmark not defined.**](#_Toc324710026)

[Chapter 2 : Literature Review 7](#_Toc324710027)

[2.1. Introduction 7](#_Toc324710028)

[2.2. Related work 7](#_Toc324710029)

[2.3. Summary 7](#_Toc324710030)

[Chapter 3 : Figures and Tables 8](#_Toc324710031)

[3.1. Location and citation **Error! Bookmark not defined.**](#_Toc324710032)

[3.2. Additional section 12](#_Toc324710033)

[Discussion and Conclusions 13](#_Toc324710034)

[References 14](#_Toc324710035)

[Appendix A: One Appendix 15](#_Toc324710036)

[Appendix B: Another Appendix 16](#_Toc324710037)

List of Tables

You can create the list of tables by going to the “References” tab and click on the “Options…” button, then select “FECU Thesis Table Caption” style and click “Ok”.

[Table 3.1: Example table for demonstration 9](#_Toc324753364)

[Table 3.2: Another example wide table for demonstration 11](#_Toc324753365)

[Table A.1: Sample table in the appendix 15](#_Toc324753366)

List of Figures

Similarly, you can create the list of figures.

[Figure 3.1: Example figure for demonstration **Error! Bookmark not defined.**](#_Toc324753376)

Nomenclature

You may include a list of alphabetically ordered symbols and abbreviations here.

Abstract

This file is provided to help graduate students at the Faculty of Engineering, Cairo University in preparing their theses according to the regulations and format guidelines defined by the graduate committee. Students are required to consult the regulations for thesis preparation available at the department of graduate studies besides using this template.

In this template, different styles are defined which start with “FECU Thesis” phrase. You may use these styles to quickly format your text throughout the thesis. You may also change these styles as long as they comply with the regulations for thesis preparation.

1. : Introduction
   1. Worldwide statistics

Prosthetic devices are becoming more widely used around the world. A prosthetic can now be used to replace any component of the body. Bio-mechatronics is the science of combining mechanical devices with human muscle, skeleton, and neurological systems to help or increase motor units that have been lost due to accident, sickness, or defect [1]. worldwide statistics reported in 2017, 57.7 million people were living with limb amputation due to traumatic causes worldwide. Leading traumatic causes of limb amputation were falls (36.2%), road injuries (15.7%), other transportation injuries (11.2%), and mechanical forces (10.4%). The highest number of prevalent traumatic amputations was in East Asia and South Asia followed by Western Europe, North Africa, and the Middle East, high-income North America, and Eastern Europe. Based on these prevalence estimates, approximately 75,850 prosthetists are needed globally to treat people with traumatic amputations.[2]

Chart, pie chart

Description automatically generated

**Figure 1.1: shows the different causes of amputations**

Congenital hand and upper extremity anomalies statistics in newborn infants have risen dramatically worldwide, studies have proven this claim in different countries around the world. Giele, et al utilized a total population study of Western Australia over 11 years and reported an upper limb anomaly prevalence of 1 in 506 live births (19.8 per 10,000 live births).[[3](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5063649/#R2)] Koskimies, et al evaluated the Finnish Registry of Congenital Malformations over 13 years and found an incidence of upper limb abnormalities of 5.25 per 10,000 live births.[[4](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5063649/#R3)] And Ekblom, et al, utilizing multiple registries in Sweden, documented a national upper limb anomaly incidence of 21.5 in 10,000 live births.[[5](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5063649/#R4)] The variability is based on differing populations, registry differences, and different inclusion criteria. Nonetheless, these data help frame any discussion of the impact of congenital upper limb anomalies on society.

* 1. Prostheses development

One may say that a person's body is their most precious possession. The difficulty of replacing a missing human limb, particularly a hand, makes one properly understand the complexities of the human body. Innovators have been attempting to restore amputated limbs with artificial limbs for millennia. Several ancient prosthetic devices from many cultures around the world have been found, illustrating the development of prosthetic technology. The development of prosthetic limb design has been relatively gradual up until recently. Simple prosthetic devices can be looked on as early innovations like the wooden leg. The past demonstrates that prostheses have largely remained passive tools that provide limited control and mobility.

Over time materials improved and designs started incorporating hinges and pulley systems. This led to simple mechanical body powered devices such as metal hooks which can open and close as a user bends their elbow for example.

Recent times however have given way to enormous advancements in prosthetic devices. Focus is not only on the physical aspects of a device but also the control and biofeedback systems. Slowly we are approaching an advanced trans-human integration between machine and body. Perhaps sometime in the future prosthetic devices will be faster, stronger, and maybe even healthier than our biological limbs.

Throughout the course of this thesis, we will explore myoelectric prosthetic arms. It is aimed to design a device which mimics the function of the human arm as best as possible and can be controlled to some extent by muscular contractions.

***Passive Prostheses***

Passive prostheses are straightforward, immobile devices designed to help amputees regain basic usefulness and aesthetic appeal. An example of a straightforward passive prosthetic is a wooden "pirate" peg leg. As shown in the image on the right, artificial toes have even been discovered linked to mummies from ancient Egypt.

A close-up of a lobster

Description automatically generated with low confidence

**Figure 1.2: A leather and wood prosthetic toe was discovered on an ancient Egyptian mummy that was discovered between 950 and 710 B.C. (photo courtesy of the Cairo Museum of Egyptian Antiquities)**

***Mechanical/Body Control Prostheses***

Control of body powered prosthesis is accomplished through a harness fastened to the user. They typically consist of a modest tool like a mechanical hook that is connected to shoulder and elbow movement. Although these gadgets are very straightforward, they continue to be the most common kind of prosthesis in use today.



**Figure 1.3: body powered bionic arm (body powered prosthetic solutions ottobock)**

***Myoelectric Controlled Prostheses***

Myoelectric prostheses track electromyography (EMG) signals that are produced when muscles close to an amputee's remaining limb contract. Electrodes are used to measure these impulses, either directly in the muscles or on the skin's surface. After being amplified, these signals are then transmitted to a microcontroller, which uses the data to analyze the signals and operate the internal actuators. Mechanical devices cannot be controlled to the same extent as myoelectric devices.

A picture containing person, person, arm

Description automatically generated

**Figure 1.4: Myoelectric Controlled arm (Bebionic)**

***Direct Brain interface***

Direct brain neural interfaces are the most advanced form of control. Electrode arrays attached to pedestals implanted in the patient's skull are placed during surgery on the patient's brain or by using EEG head array of electrodes. A robotic arm is moved in response to motion signals picked up on the pedestals by the patient.

* 1. Challenges

A functional prosthetic arm must overcome various design and manufacturing obstacles. The goal of this thesis is to develop an arm of a quality and complexity that can be used for prosthetics research in the future. The reader should be aware that this work spans a variety of engineering specialties. Each area will receive the proper discussion, and we'll work to integrate all of them into a single, reliable system.

The main topics that this thesis will cover are listed below.

**Physical Design**

The degree to which the machine replicates the human arm and the degree of dexterity it can provide are determined by the complexity of the mechanical and electrical systems. The plan will strive for the highest level of physical sophistication.

**Weight and dimensions**

We should also take into account the weight and dimensions of the arm to be easily wear and used.

**Usability and control**

A prosthesis should ideally be as simple and effortless to use as possible. The prosthesis is probably of no practical use if the user must struggle to carry out even the most elementary actions, such gripping an object. the objective is to create a prosthetic that can help those who are missing their hands.

**Safety**

We should ensure that the patient is safe from any leakage current as well as take in mind the material used is electrical insulator.

**Aesthetically appealing**

We deal with a special customer with special abilities which we should take in consideration his psychology and that the product befits his needs and desires of having a new arm with a great look as a lot of the patients may have suffered of traumas as well as bullying from losing their limbs.

**Response time**

Response time is a deciding factor in prostheses we do not want a slow arm which cannot cope with our daily routines

**Affordable**

We'll work to keep the device's material cost as low as we can. Myoelectric prosthetic arms for sale nowadays typically cost between $20,000 and $40,000. This design will not require more than $1000 in materials. In-depth discussions of each of these issues, in particular the physical design and control system, will be included in this thesis.

* 1. World market of prostheses

Research in bionics have increased dramatically in the last 10 years due to the increase in amputation rates as well as congenital limb defects according to the previous studies. Be Bionic one of the leading private companies in the field of prosthetic arms are designing a myo-controlled prosthetic arm which is based on a 14 movement patterns pre-selected and saved in the bionic arm which can be cycled through an external push button and activated with the myo-electric sensor connected to the patient forearm [6]. These 14 movement patterns are shown in the figures below.

Diagram

Description automatically generatedDiagram

Description automatically generated

**Figure 1.5: shows hand grips pre-saved on the Be Bionic arm**

Other companies such as open bionics and unlimited tomorrow are also taking the same approach with slightly different control scheme and physical design, but all save their grips on the microcontroller and cycle between them with buttons

We are adopting the same control scheme with our own design and touch we aim to introduce this technology to the middle east. We visited a lot of different local companies in Egypt which designed prosthetic arms mechanically powered, and companies which import their products none of them had their own design of myo-electric prosthetic arm. In the next section we will talk about our 3d printed design, materials used, motors, motor divers and microcontroller.

1. : Literature Review
   1. Introduction

References throughout the thesis are cited using a number between square brackets [#], where the number of the cited reference is assigned in the list of references provided at the end of the thesis. If you refer to two documents, use the following format [6, 7]. If you refer to more than three documents listed consecutively, use the format [5-8]. You may use “Cross-reference” tool in MS Word for citing the reference number. For example:

BouwkampandBolhom [‎1] stated that…

….. as found in [‎3].

You may otherwise use the “References” tab in MS Word to manage your references and their citations.

* 1. Related work

Body text.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Body text.Body text.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Body text.

Body text.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Body text.Body text.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Body text.

* 1. Summary

Body text.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Body text.Body text.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Body text.

1. : Software to hardware interface
   1. Micro-Controller

Due to its ultra-low power consumption, the ATmega2560 was chosen as the microcontroller in our project for a number of reasons.

- Power-down Mode: 0.1 A at 1.8V

-Active Mode: 1MHz, 500 A

-86 lines of programmable I/O

-ADC 16 channels, 10 bits

-Temperature Range: Industrial -40C to 85C

-Compatible with the Arduino platform, which includes a large community, a wealth of information, and a fantastic starter package called the Arduino Mega Pro mini,

This is a tiny, inexpensive alternative to the well-liked Arduino Mega 2560. Genuine Atmel ATmega2560 microprocessor and the inexpensive USB-UART interface are used in its assembly.

The Arduino Mega 2560 is compatible with this board. It is a great option for creating ATmega2560-based projects because to its small form factor of 38 x 54mm.

|  |
| --- |
| See the source image |
| Figure 3.1: Example figure for demonstration |

* 1. IDE

The following are the benefits of using Arduino IDE:

- Free licensing.

- integrated MCU drivers

- Capable of plotting Signal graph which is significant to our research.

- user friendly

- better debugging

* 1. Motor control

As mentioned in the previous chapter, we are using our own motor driver with stepper motor technology. The motors actuate with steps, and each step is controlled by writing a sequence of four steps to each of the two digital pins of each motor. If we want to reverse the direction, we simply reverse the sequence's order, so for clockwise direction, the sequence is low low, low high, high high, and high low.

We determine the number of steps the motor should move for each grip, then we divide the number of steps by four and loop on the number of sequences.

Then, we used our finger-reversing mechanism, flex sensors on each finger to measure the degree of binding of each finger, and in the event that the springs failed to pull the fingers manually, we turned the motors around in accordance with the sensor reading.

This approach is more advantageous than preserving the steps taken on the MCU and reversing in accordance with it because fingers could be manually changed, resulting in a different angle and number of steps to return to the default position.

In addition, if the motor started from a different position than the default, the flex sensor reading determines when to stop the motor.

* 1. Sensors

Then, we used our finger-reversing mechanism, flex sensors on each finger to measure the degree of binding of each finger, and in the event that the springs failed to pull the fingers manually, we turned the motors around in accordance with the sensor reading.

This approach is more advantageous than preserving the steps taken on the MCU and reversing in accordance with it because fingers could be manually changed, resulting in a different angle and number of steps to return to the default position.

In addition, if the motor started from a different position than the default, the flex sensor reading determines when to stop the motor.

To provide feedback to various sensors, we used RGB LED, we used a thermistor on the palm so that when it reaches a certain threshold, RGB turns red, and the vibrating motor also turns on. We also used a voltage sensor to monitor the battery voltage, and when it drops below 75%, RGB turns red and waits until it drops to 70% before vibrating the vibration motor and turning off the stepper motors.

* 1. EMG sensor

we planned first to use Myo arm band which is an array of wireless EMG sensors which can detect different patterns of contraction in the forearm muscles and according we can detect which finger specifically is moved as it has its own DSP unit as well as the ability to operate with different wireless protocols, we aimed to differentiate between grips with it and between different degrees of grip closing according to signal strength but unfortunately it was out of stock in a lot of online stores and we could not find any available bands we could only find used ones in an online Pakistani store which cannot be delivered to Egypt.

|  |
| --- |
| See the source image |
| **Figure 3.1: shows Myo armband** |

We used an EMG module, but it was so noisy that we could only use it as a trigger because we couldn't distinguish between different signal patterns. To control the EMG's output, we also employed the PID controller algorithm. The EMG sensor is linked to the MCU through two pins, one for the analogue input signal and the other for ground. We obtain our analogue reference from a potentiometer, which we calibrate manually rather than using code reference, so that we may calibrate manually without having to alter the code.

When the signal surpasses the threshold specified by the potentiometer on the trigger of the grip, a flag is set in the software.

* 1. Additional section

Body text.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Body text.Body text.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Body text.Body text.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Body text. Body text.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Body text

Body text.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Body text.Body text.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Bodytext.Body text.

Discussion and Conclusions

In this research, the common industrial problem of … . As extension to this work, the following points are recommended for the future work;

References

1. Bouwkamp, J.G., and Bolhom, J.K., 1963, “Dynamic Response of a Two-Story Steel Frame Structure”, Bulletin of the Seismological Society of America, Vol. 56, No. 6, pp. 1289-1303.
2. Newmark, N.M., and Resenblueth, E., 1971, Fundamentals of Earthquake Engineering, Vol. xx, 2nd edition, Prentice Hall Inc., Englewood cliffs, N.J., USA.
3. Caravani, P., and Thomson, W.T., 1973, “Identification of Damping Coefficients from System Response”, Proceedings of the Fifth World Conference on Earthquake Engineering, Rome, Italy.
4. Ruiz, P., and Penzien, J., 1969, “Probabilistic Study on the Behavior of Structures During Earthquake”, Earthquake Engineering Research Center Report No. EERC 69-3, University of California, Berkeley, Calif., USA.
5. INFORMS web site, January 2012, <http://www.informs.org>.
6. Ibrahim, M., 2012, “A parametric study on …”, M.Sc. Thesis, Faculty of Engineering, Cairo University, Giza, Egypt.

Appendix A: One Appendix

Table A.1: Sample table in the appendix

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |

Appendix B: Another Appendix

**الملخص**

يكتب هنا الملخص باللغة العربية مع مراعاة عدم استخدام المصطلحات مكتوبة باللغة الإنجليزية بقدر الإمكان و خصوصا إذا كان هناك تعريب متوفر لتلك المصطلحات. و يمكن للطالب الرجوع إلى معاجم المصطلحات المعتمدة من مجمع اللغة العربية في هذا الشأن.

|  |  |
| --- | --- |
| **مهنـدس:**  ضع صورتك هنا | ................................... |
| **تاريخ الميلاد:** | ....\....\.......... |
| **الجنسية:** | ................... |
| **تاريخ التسجيل:** | ....\....\.......... |
| **تاريخ المنح:** | ....\....\....... (تذكر سنة المنح فقط) |
| **القسم:** | ........................... |
| **الدرجة:** | ماجستير العلوم (أو دكتوراه الفلسفة) |
| **المشرفون:** |  |
|  | ا.د. .......................... |
|  | ا.د. ............................ |
|  | د. ............................ |
| **الممتحنون:** |  |
|  | أ.د.................... (المشرف الرئيسي) |
|  | أ.د.................... (المشرف) |
|  | أ.د.................... (الممتحن الداخلي) |
|  | أ.د.................... (الممتحن الخارجي)  **يذكر الوظيفة وجهة العمل لكل أستاذ دكتور من خارج الكلية** |
| **عنوان الرسالة:** |  |
| .................................................................................................  ................................................................................................. | |
|  |  |
| **الكلمات الدالة: (يجب أن تتكون من 5 كلمات فقط)** | |
| ................، ..................، ..............، ................، .................. | |
|  |  |
| **ملخـص الرسالة: (لا يزيد عن 150 كلمة ولا يتخطى صفحة أخري)** | |
| ..................................................................................................  ..................................................................................................  ..................................................................................................  ..................................................................................................  ..................................................................................................  ..................................................................................................  .................................................................................................. | |

عنوان الرسالة\*\*

اعداد

**اسم الطالب\*\***

رسالة مقدمة إلى كلية الهندسة – جامعة القاهرة

كجزء من متطلبات الحصول على درجة

**ماجستير العلوم (او دكتوراه الفلسفة )\*\***

في

**اسم القسم\*\***

يعتمد من لجنة الممتحنين:

**الاستاذ الدكتور:\*\* المشرف الرئيسى**

**الاستاذ الدكتور:\*\* مشرف**

**الاستاذ الدكتور:\*\* الممتحن الداخلي**

**الاستاذ الدكتور:\*\* الممتحن الخارجي**

* يذكر الوظيفة وجهة العمل لكل أستاذ دكتور من خارج الكلية

كليــة الهندســة - جامعــة القاهــرة

الجيـزة - جمهوريـة مصـرالعربيــة

سنة

* \*يجب على الطالب الرجوع الى ادارة الدراسات العليا لأختلاف بعض الأقسام حول التخصص
* \*\* لابد من كتابتها بخط سميك

عنوان الرسالة\*\*

اعداد

**اسم الطالب\*\***

رسالة مقدمة إلى كلية الهندسة – جامعة القاهرة

كجزء من متطلبات الحصول على درجة

**ماجستير العلوم (او دكتوراه الفلسفة)\*\***

في

**اسم القسم\*\***

تحت اشراف

|  |  |
| --- | --- |
| **اسم المشرف\*\*** | **اسم المشرف\*\*** |
| اللقب العلمى و الجهة | اللقب العلمى و الجهة |

كليــة الهندســة - جامعــة القاهــرة

الجيـزة - جمهوريـة مصـرالعربيــة

سنة

* \*يجب على الطالب الرجوع الى ادارة الدراسات العليا لأختلاف بعض الأقسام حول التخصص
* \*\* لابد من كتابتها بخط سميك

|  |  |
| --- | --- |
| old_logo_color | CairoU-logo |

عنوان الرسالة\*\*

اعداد

اسم الطالب\*\*

رسالة مقدمة إلى كلية الهندسة – جامعة القاهرة

كجزء من متطلبات الحصول على درجة

**ماجستير العلوم (او دكتوراه الفلسفة)\***\*

في

**اسم القسم\*\***

كليــة الهندســة - جامعــة القاهــرة

الجيـزة - جمهوريـة مصـرالعربيــة

سنة

* \*يجب على الطالب الرجوع الى ادارة الدراسات العليا لأختلاف بعض الأقسام حول التخصص
* \*\* لابد من كتابتها بخط سميك