

## EDUCATION

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- **Egypt FWD Scholarship** Cairo, Egypt  
*Nano-Degree in Data Analysis-Professional* Oct. 2022
- **University of Pittsburgh** Pittsburgh, USA  
*Doctor of Philosophy in Industrial Engineering; GPA: 3.78* Dec. 2021
- **Cairo University** Cairo, Egypt  
*Master of Science in Mechanical Engineering; GPA: 4.0* Aug. 2016
- **Cairo University** Cairo, Egypt  
*Bachelor of Engineering in Mechanical design and Production; GPA: 3.84* May. 2012

## EXPERIENCE

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- **Cairo University** Cairo, Egypt  
*Program Coordinator* Mar. 2022 - Present
  - **Mechanical Design and Mechatronics Programs Coordinator**
    - Collaborate on curriculum development and plan program activities.
    - Provide academic advising and support to more than 350 Students
    - Develop strategies for program promotion and coordinate internships and placements.
    - Manage student enrollment and oversee the program progress.
    - Ensure accreditation compliance, foster faculty collaboration, and drive continuous improvement.
- **Cairo University** Cairo, Egypt  
*Assistant Professor* Feb. 2022 - Present
  - **Research Scope**
    - My research will include development of medical devices, especially endovascular devices. The development includes design, analysis, manufacture and test the medical devices related to certain applications
  - **Teaching Scope**
    - I will instruct courses in different departments at Cairo University, including Stress Analysis, Elasticity and Plasticity, Design, and other related courses.
- **University of Pittsburgh** Pittsburgh, PA  
*Research Assistant/Teaching Assistant* Aug. 2016 - Jan. 2022
  - **Long Retrievable Stent Graft to Control Torso Hemorrhage for Trauma Injuries**
    - Analyzed, manufactured, optimized and tested the longest standalone stent graft for controlling internal hemorrhage from traumatic injuries in aortic artery.
    - Investigated the designing and manufacturing methods comprehensively, and their impact on the stent graft performance.
    - Quantified *in vitro* the radial force, the retrieval capability and the bleeding control.
    - Manufactured functional device to be used for swine trials.
  - **Perfuse Dual Chamber Stent to Improve Donor Abdominal Organ Recovery**
    - Developed double chambers stent graft to expand transplanting organ pool.
    - Designed and manufactured a graft to enable abdominal organs isolation from the cardiac flow.
    - Optimized the laser welding parameters to achieve the required performance of the graft metallic backbone.
    - Measured *in vitro* the pressure and flow rate in response of the device insertion.
    - Optimized the stent graft *in vivo* through swine trials, until manufacture of a functional device to be used for 1 hour inside swine model.
  - **A Nanosensor-Integrated Stent for Wireless Monitoring of Restenosis Progression**
    - Developed an artery model using structural analysis module of ANSYS workbench, and simulated the hyperelastic behaviour of the artery, and plaque.
    - Simulated the flow alteration of the blood due to restenosis growth using ANSYS CFD module. Simulated the non-newtonian behaviour of the blood using carreau model.
    - Developed a testing setup to measure the pressure and flow rate of fluid mixture to produce a physiologically artery model.
    - Measured the strain using image processing of the artery model deformation via a developed MATLAB code.

## ● Cairo University

Cairo, Egypt

*Research Assistant/Teaching Assistant*

*April 2014 - Aug. 2016*

### ○ Development of Compliant Mechanism for Vibration Energy Harvesting

- Designed and modeled a compliant mechanism used in vibration-based harvester that is able to power micro-scale devices.
- Developed a compliant mechanism for vibration displacement amplification.
- Developed an analytical model to calculate the displacement amplification, stresses and fatigue generated due to loading variation.
- Developed an experimental setup to measure the harvested energy using a system of the compliant mechanism and a piezoelectric transducer.

## TEACHING EXPERIENCE

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### ● University of Pittsburgh

Pittsburgh, USA

Probability and Statistics (Instructor, Fall 2020), Probability and Statistics (Teaching Assistant, Spring 2017), and Introduction to Manufacturing (Teaching Assistant, Fall 2016)

### ● Cairo University

Cairo, Egypt

Stress Analysis, Theory of Mechanisms and Machines, Solid Mechanics, Automatic Control, Modeling and Simulation, and Mechanical Vibrations

## OTHER PROJECTS

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- **Double Folding for Pre-Strained Polymer** Characterized and controlled the kinetics and direction of self-folding of pre-strained polystyrene (PSPS). Achieved bi-directional folding by using Shape Memory Polymer (SMP) and polyimide tape
- **Electromagnetic System for Rapid Cannulation of Fenestrated Endovascular Grafts (EMAG)** Measured the magnetic flux of fabricated coils that facilitate and expedite cannulation.
- **Laser Cutting System Design and Integration** Designed the required motion controller to be used for laser cutting of Nickel Titanium stents. Collaborated with AEROTEK company to fabricate the motion controller. Assisted in integration of laser cutter with the motion controller.
- **Tongue Prosthetic Assist Device to Facilitate Swallowing for Dysphagia Patients** Measured the resistance force of sliding Nickel-Titanium wires through guiding tubes using mechanical test system. Participated in writing a scientific manuscript for device development and characterization.
- **Bi-material Aortic valve for Pediatric Patients** Calculated the radial force of Bi-material valve backbone using structural analysis module of ANSYS workbench, and simulated the superelasticity behaviour of Nickel-Titanium.

## INTERNSHIPS

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- **Wireline Petroleum Logging, Baker Hughes, Egypt** Worked in the department of Prevented Maintenance of Wireline Petroleum Logging. Measured and calibrated devices that being used in field.
- **Petroleum Refinery, AHMADI Bay Refinery, Kuwait** Worked in the maintenance of heat exchangers, boilers, pipelines and granulation machines. Worked on refining processes and transportation of petroleum products.
- **Steel Production, EZZ steel, Egypt** Introduced to process of continuous production of flat steel, servo-systems, electric furnaces, rolling systems and quality control for products.

## TECHNICAL SKILLS

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- **CAD:** Solidworks.  
**Characterisation:** SEM.  
**FEM:** ANSYS APDL, COMSOL, FEBio.  
**CFD:** Fluent.  
**Simulation:** Simulink.  
**Control and DAQ:** LABVIEW, Signal Express.  
**Programming:** R, Python, Mathematica, MATLAB.

## PUBLICATIONS

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- Emery SP, Greene S, **Elsisy, M.**, et al. In vitro and in vivo assessment of a novel ultra-flexible ventriculoamniotic shunt for treating fetal hydrocephalus. *Journal of Biomaterials Applications*. 2023;37(8):1423-1435
- Ibrahim, M.; Nghiem, K.X.; Chung, K.; **Elsisy, M.**; Gosai, U.J.; Kim, S.; Ye, S.; Wagner, W.R.; Chun, Y. A Novel Low-Profile Self-Expanding Biodegradable Percutaneous Heart Valve Frame That Grows with a Child. *Coatings* 2023, 13, 184. <https://doi.org/10.3390/coatings13010184>
- Herbert R, **Elsisy, M.**, Rigo B, et al. Fully implantable batteryless soft platforms with printed nanomaterial-based arterial stiffness sensors for wireless continuous monitoring of restenosis in real time. *Nano Today* 2022;46:101557
- **Elsisy, M.**, Tillman B, Chau L, Go C, Cho SK, Chun Y. In vitro and In vivo assessment of a novel organ perfusion stent for successful flow separation in donation after cardiac death. *Journal of Biomaterials Applications*. 2022;37(3):389-401
- **Elsisy, M.**; Poska, E.; Abdulhafez, M.; and Bedewy, M. "Current-Dependent Dynamics of Bidirectional Self-Folding for Multi-Layer Polymers Using Local Resistive Heating." *ASME. J. Eng. Mater. Technol.* 2021; 143(3): 031004.
- **Elsisy, M.**; Tillman, BW.; Go, C.; Kuhn, J.; Cho, SK.; Clark, WW.; Park, J.; Chun, Y. "Comprehensive assessment of mechanical behavior of an extremely long stent graft to control hemorrhage in torso." *J Biomed Mater Res*. 2020; 108: 2192– 2203.
- **Elsisy, M.**, and Chun, Y. "Materials Properties and Manufacturing Processes of Nitinol Endovascular Devices," *Bio-Materials and Prototyping Applications in Medicine*, P.J. Bártolo, and B. Bidanda, eds., Springer International Publishing, Cham, 2020, pp. 59–79.
- Chun, Y.; Chen, Y.; **Elsisy, M.**; Sukinik, J.; Shridhar, P.; Park, J.K.; Kim, Y.B.; Hong, C.K.; Chung, J. "In vitro and in vivo experiments of a novel intraarterial neurovascular decompressor for treating neurovascular compression syndromes: a brief report." *Neurol Res*. 2019;41:665-670.
- Shayan, M.; Gildener-Leapman, N.; **Elsisy, M.**; Hastings, J.T.; Kwon, S.; Yeo, W.-H.; Kim, J.-H.; Shridhar, P.; Salazar, G.; Chun, Y. "Use of Superelastic Nitinol and Highly-Stretchable Latex to Develop a Tongue Prosthetic Assist Device and Facilitate Swallowing for Dysphagia Patients." *Materials* 2019, 12, 3555.
- Go C, **Elsisy, M.**, Frenz B, Tevar AD, JB Moses JB, Demetris AJ, C. Y. and T. B., 2021, "Dual Chamber Stent Protects Against Warm Ischemia of Donor Organs in a Model of the Donation After Cardiac Death Agonal Phase," *Surgery*.
- **Elsisy, M.**, Shayan M., Chen Y., Tillman B.W., Go, C., Chun Y., "Assessment of mechanical and biocompatible performance of ultra-large Nitinol endovascular devices fabricated via a low-energy laser joining process". *Journal of Biomaterials Applications*. 2021;36(2):332-345.
- **Elsisy, M.**, Herbert, R., Yeo, W.H., Pacella, J.J., and Chun, Y. "Development of a nanosensor-integrated stent for wireless, continuous monitoring of restenosis progression", *Proc. SPIE 11590, Nano-, Bio-, Info-Tech Sensors and Wearable Systems*, 1159006 (22 March 2021);
- Go, C., **Elsisy, M.**, Chun, Y., Thirumala, P., Clark, W., Cho, S., Demetris, A., Tillman, B., 2020, "A three-tier Rescue stent improves outcomes over balloon occlusion in a porcine model of noncompressible hemorrhage," *Journal of Trauma and Acute Care Surgery*, 89(2), pp. 320-328.
- Go, C, Kuhn, J, **Elsisy, M.**, Chun, Y., Tillman, B. W., "Rescue stent improves outcomes compared with resuscitative endovascular balloon occlusion of the aorta in noncompressible hemorrhage." *J Am Coll Surg* 2019; 229: S308–S309.
- Chun, Y., Chen, Y., **Elsisy, M.**, Sukinik, J., Shridhar, P., Park, J., Kim, Y., Hong, C., Chung, J., 2019, "In vitro and in vivo experiments of a novel intra-arterial neurovascular decompressor for treating neurovascular compression syndromes: a brief report," *Neurological Research*, 41(7), pp. 665-670. .

## CONFERENCE PRESENTATION

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- **Elsisy, M.**, S. P. Emery, S. Greene, N. Hazen, and Y. Chun. A Soft Silicone-Nitinol-ePTFE Ventriculoamniotic Shunt For Treating Fetal Aqueductal Stenosis. *BMES 2021, Orlando, FL, October 6-9, 2021*.
- **Elsisy, M.**, Herbert, R., Yeo, W., Pacella, J., and Chun, Y., "Development of a new electronic stent and in vitro test platform to continuously monitor the progression of in-stent restenosis," 2021 SPIE Smart Structures NDE, Long Beach, CA.
- **Elsisy, M.**, Tillman, B. W., Go, C., Shayan, M., Frenz, B., Chen, Y., Cho, SK., and Chun, Y., "A New Geometrically Complex Endograft Used in Organ Transplant Successfully Developed via an Optimized Microlaser Welding Process," *BMES 2020, Virtual*.
- **Elsisy, M.**, Tillman, B. W., Go, C., Kuhn, J., and Chun, Y., "Enhanced Mechanical Performance in a New Long Retrievable Stent Graft to Control Torso Hemorrhage," *BMES 2019, Philadelphia, PA*.
- **Elsisy, M.**, Tillman, B. W., Go, C., and Chun, Y., "Design and Manufacturing A Novel Customizable Nitinol-PTFE Stent Graft for Effective Torso Hemorrhage Control," 2019 McGowan Retreat, Pittsburgh, PA.

- Chun, Y., **Elsisy, M.**, Tillman, B., and Go, C., “Translational Endovascular Device Research using NiTi Smart Material,” UKC 2019, Chicago, IL.
- **Elsisy, M.**, Tillman, B. W., Go, C., Kuhn, J., Cho, S. K., Clark, W. W., Park, J., and Chun, Y., “A retrievable stent graft for hemorrhage control using laser-welded nitinol stent covered with an ultra-stretchable ePTFE,” IMECE 2018, Pittsburgh, PA.
- Chen, Y., Tillman, B.W., Go, C., **Elsisy, M.**, and Chun, Y., “A novel customizable stent graft that contains superelastic nitinol and highly-stretchable ePTFE,” BMES 2018, Atlanta, GA.

#### AWARDS

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- **2020 Michael G. Wells Student Healthcare Competition, Pittsburgh, PA, USA** Awarded \$5000 for development and investigation for the commercial capability of organ perfusion stent (OPS).
- **University of Pittsburgh Fellowship 2016-2021, Pittsburgh, PA, USA** Awarded full-time scholarship, based on academic merit, and covers the tuition and the computing and network service fee for these terms.
- **Mechanical Design Engineering Department Fellowship 2009-2012, Cairo, Egypt** Awarded full scholarship, funded by Egyptian Ministry of Industry and Trade.

#### HOBBIES & ACTIVITIES

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- Swimming, Open Water Diving, Hiking, Mountain Climbing, Static Parachuting, Skiing, SandBoarding, Squash, Tennis