

Alaa Khalifa

Ph.D., Lecturer

Personal Informations

Date of Birth 30 November 1988

Place of Birth Egypt

Nationality Egyptian

Research Interests

- Design, and Control of Parallel Robots.
- Minimally Invasive Surgical Robots.
- Teleoperation Systems.
- Robust and Intelligent Control.

Education

2015–2018 **Ph.D. in Mechatronics and Robotics Engineering**, *Egypt-Japan University of Science and Technology (EJUST) & Waseda University, Egypt & Japan, CGPA: 3.95.*

Research Title: Design, Control, and Implementation of a New Dexterous Parallel Manipulator for Minimally Invasive Surgery.

Supervisors: Prof. Mohamed Fanni, EJUST, Egypt – Prof. Abdelfatah Mohamed, EJUST, Egypt – Prof. Tomoyuki Miyashita, Waseda University, Japan.

2013–2015 **M.Sc. in Mechatronics and Robotics Engineering**, *Egypt-Japan University of Science and Technology (EJUST)*, Egypt, *CGPA: 3.66.*

Research Title: Controller Design and Workspace Mapping of a Teleoperated Endoscopic Surgical Manipulator System.

Supervisors: Prof. Ahmed Abo-Ismael, EJUST, Egypt – Dr. Ahmed Ramadan, Tanta University, Egypt.

2005–2010 **B.Sc. in Industrial Electronics and Control Engineering**, *Faculty of Electronic Engineering, Menoufia University, Egypt, Excellent with honour degree – 89.053%.*

Graduation Project: *Design an Advanced Automation System of Production Line.* **Grade:** Excellent.

Professional Experience

Feb. 2018 - **Lecturer**, *Department of Industrial Electronics and Control Engineering, Faculty of Electronic Engineering, Menoufia University.*
Now Egypt

Sep. 2018 - **Adjunct Lecturer**, *Department of Mechanical Engineering, Mechatronics Program, College of Engineering & Technology, Arab Academy for Science, Technology & Maritime Transport.*
Now Egypt

Faculty of Electronic Engineering – Menoufia University – Egypt

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- Feb. 2019 - **Adjunct Lecturer**, *Department of Mechanical Engineering, Mechatronics Degree Program*,
 Sep. 2019 Egyptian Academy for Engineering and Advanced Technology.
 Egypt
- May.2017 - **Ph.D. Research Student**, *Miyashita Lab, Department of Modern Mechanical Engineering*,
 Nov.2017 *Faculty of Science and Engineering, Waseda University*.
 Japan
- 2013 - 2017 **Postgraduate Student**, *Department of Mechatronics and Robotics Engineering, School of Innovative Design Engineering, Egypt-Japan University of Science and Technology*.
 Egypt
- 2011 - 2013 **Teaching Assistant**, *Department of Industrial Electronics and Control Engineering, Faculty of Electronic Engineering, Menoufia University*.
 Egypt

Research Experience

- Feb.2018 - **Robotics Lab**, *Department of Industrial Electronics and Control Engineering, Faculty of Electronic Engineering, Menoufia University, Egypt*.
 Now
 - Dynamic modeling of parallel manipulators.
 - Robust and Intelligent Control.
- May.2017 - **Miyashita Lab**, *Department of Modern Mechanical Engineering, Faculty of Science and Engineering, Waseda University, Japan*.
 Nov.2017
 - Dynamic simulation and controller design of the new surgical manipulator 3-PUU.
 - Manufacturing the new 3-PUU parallel manipulator.
 - Building and testing the whole teleoperated surgical system.
- Feb.2013 - **Surgical Robotics Lab**, *Department of Mechatronics and Robotics Engineering, School of Innovative Design Engineering, Egypt-Japan University of Science and Technology, Egypt*.
 May.2017
 - Complete integration of all teleoperation surgical system practically using new endoscopic parallel manipulators as the slave manipulator and PHANTOM-Omni haptic device as the master robot.
 - Implementation of a suitable and efficient mapping technique for the teleoperation system.
 - New geometrical/analytical approach for reciprocal screw-based singularity analysis was proposed for parallel manipulators with h-pitch wrench systems.
 - New 3-PUU parallel manipulator was designed to serve as an endoscopic surgical manipulator.
 - Unique arrangement of the manipulator's joints enables superior characteristics.
 - Thoroughly kinematic analysis of the new manipulator.

Funds and Projects

- 2013 **Participation in STDF Project**, *Project ID: 4100*, Project budget: 1,000,000.0 L.E,
 Place: Egypt.
Project Title: Development of Endoscopic Manipulator for Minimally Invasive Robotic Surgery.
Principal Investigator: Prof. Ahmed Abo-Ismael, EJUST, Egypt.

Awards and Honors

- July. 2020 **Research Fellow Grant**, *CIRI Lab, ALMA MATER STUDIORUM - Università di Bologna*.
 Italy
- April 2019 **First Place and Championship Cup**, *Under my supervision, Menoufia university team won the first place and the championship cup in the tenth forum of robot competition held at Helwan University, Egypt, April 4-8, 2019.*

- 2017 **Winning a prize**, in the 4th Cairo Innovates exhibition dated November 22-23, 2017, "New 3-DOF Dexterous Parallel Manipulator for Minimally Invasive Surgery".
- 2017 **Ph.D. Research Student Grant**, Miyashita Lab, Waseda University, Japan.
- 2016 **First Rank**, Achieving the highest GPA among all Mechatronics and Robotics Engineering Ph.D. graduate students, EJUST, Egypt.
- 2014 **First Rank**, Achieving the highest GPA among all Mechatronics and Robotics Engineering M.Sc. graduate students, EJUST, Egypt.
- 2013 **M.Sc. and Ph.D. Scholarship Grant**, Egypt-Japan University of Science and Technology, Egypt.
- 2010 **First Rank**, Achieving the highest B.Sc. grade among all the under-graduate students, Department of Industrial Electronics and Control Engineering, Faculty of Electronic Engineering, Menoufia University, Egypt.

Teaching Experience

- Spring 2019 **Lecturer**, Microcontrollers, Department of Industrial Electronics and Control Engineering, Faculty of Electronic Engineering, Menoufia University.
Egypt
- Fall 2018 - **Lecturer**, Machines Theory, Department of Industrial Electronics and Control Engineering,
Fall 2019 Faculty of Electronic Engineering, Menoufia University.
Egypt
- Fall 2018 - **Adjunct Lecturer**, Mechatronics, Department of Mechanical Engineering, Mechatronics
Spring 2019 Program, College of Engineering & Technology, Arab Academy for Science, Technology & Maritime Transport.
Egypt
- Fall 2018 - **Adjunct Lecturer**, Mechatronics Systems, Department of Mechanical Engineering, Mecha-
Spring 2019 tronics Program, College of Engineering & Technology, Arab Academy for Science, Tech- nology & Maritime Transport.
Egypt
- Spring 2019 **Adjunct Lecturer**, Measurements and measuring devices, Department of Mechanical Engineering, Mechatronics Degree Program, Egyptian Academy for Engineering and Advanced Technology.
Egypt
- 2011 - 2013 **Teaching Assistant**, Department of Industrial Electronics and Control Engineering, Faculty of Electronic Engineering, Menoufia University, Egypt.
 - Programmable Logic Controllers
 - Measurements
 - Laboratory Test (OP-Amp Circuits)
 - C++ Programming Language (Summer Training)
 - Photo-Voltaic Solar Cells (Summer Training)

Publications

○ Patent:

- 2017 **Mohamed Fanni and Alaa Khalifa**, "New 3-DOF Dexterous Parallel Manipulator for Minimally Invasive Surgery", Patent, Place: Egypt & Japan, Filing no.: 2017/1477, Date: Sep. 6, 2017.

Journal Publications:

- 2018 **Alaa Khalifa**, *Mohamed Fanni, Abdelfatah M. Mohamed, and Tomoyuki Miyashita*, "Development of a New 3-DOF Parallel Manipulator for Minimally Invasive Surgery", *The International Journal of Medical Robotics and Computer Assisted Surgery*, DOI:10.1002/rcs.1901, 2018.
- 2017 **Alaa Khalifa**, *Mohamed Fanni, and Abdelfatah M. Mohamed*, "Geometrical/analytical approach for reciprocal screw-based singularity analysis of a novel dexterous minimally invasive manipulator", *Robotics and Autonomous Systems*, vol. 98, pp. 56-66, 2017.
- 2015 **Alaa Khalifa**, and *Ahmed Ramadan*, "Intelligent Control System Design for a Teleoperated Endoscopic Surgical Robot", *Applied Mechanics & Materials*, Vol. 789, pp. 693-699, 2015.

Conference Publications:

- 2018 , *Victor Parque, Alaa Khalifa, and Tomoyuki Miyashita*, "Towards Stagnation-Free Particle Swarm Optimization and its Application to PID Control Tuning", in *SICE International Symposium on Control Systems (SICE ISCS)*. IEEE, 2018.
- 2016 **Alaa Khalifa**, *Mohamed Fanni, and Abdelfatah M. Mohamed*, "Singularity Analysis of a Novel 4-DOF Surgical Robot", in *IEEE International Conference on Information Science and Control Engineering (ICISCE)*, IEEE, 2016, pp. 1126–1130.
- 2014 **Alaa Khalifa**, *A. Ramadan, K. Ibrahim, M. Fanni, S. Assal, and A. Abo-Ismael*, "Workspace Mapping and Control of a Teleoperated Endoscopic Surgical Robot", in *19th IEEE International Conference on Methods and Models in Automation and Robotics (MMAR)*, IEEE, 2014, pp. 675–680.

Languages

Arabic Native
English Fluent

TOEFL IBT (Dec. 2014): 84

Computer skills

Programming MATLAB, C/C++, Python
Tools Robotic Toolbox, MSC ADAMS, Protues, SOLIDWORKS, CATIA
Miscellaneous Microsoft Windows, L^AT_EX, Microsoft Office
Microcontroller PIC, Arduino
PLC Siemens S7-300, VIPA, Schneider TSX NANO, Schneider TSX Micro, ZELIO and LS
SCADA Siemens SIMATIC WinCC SCADA Software, VIPA WinPLC7 Software

References

Prof. Tomoyuki Miyashita, Modern Mechanical Engineering Department, Faculty of Science and Engineering, Waseda University, Japan, tomo.miyashita@waseda.jp, <http://www.miyashita.mmech.waseda.ac.jp>

Prof. Mohamed Fanni, Chairperson, Mechatronics and Robotics Engineering Department, EJUST, Egypt, mohamed.fanni@ejust.edu.eg, <https://ide.ejust.edu.eg/members-mre/>

Prof. Abdelfatah Mohamed, Mechatronics and Robotics Engineering Department, EJUST, Egypt, abdefatah.mohamed@ejust.edu.eg, <https://ide.ejust.edu.eg/members-mre/>

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