Ahmed **Khalifa**

Personal Information

Birth Date 25 June 1987

Birth Place Egypt

Nationality Egyptian

Address Bureau 521, Laboratoire des Sciences du Numérique de Nantes (LS2N), École Centrale de Nantes (ECN), 1 rue de la Noë, 44321 Nantes, France

Phone +33769004347

Email ahmed.khalifa0687@gmail.com

Web page `https://amekhalifa.github.io`

Current Job

2017 – Now **Postdoctoral Researcher**, *École Centrale de Nantes*, Nantes, France.

Research Interests

My research interests span the areas of robotics and control theory. I have a specific interest in the design, analysis and motion control of robotic systems including robust, predictive, cooperative, and distributed control, and their applications in Flying/Ground Robots, Aerial/Ground Manipulators, and Multi-robot systems.

Education

2013 – 2016 **Ph.D. in Mechatronics and Robotics Engineering**, *Egypt-Japan University of Science and Technology (EJUST) - Keio University*, Egypt-Japan, *CGPA: 4.00*.
Research Title: *Controller Design and Implementation of a New Quadrotor Manipulation System*.
Supervisors: *Prof. Mohamed Fanni, EJUST, Egypt – Prof. Toru Namerikawa, Keio University, Japan*.

2011–2013 **M.Sc. in Mechatronics and Robotics Engineering**, *EJUST*, Egypt, *CGPA: 3.73*.
Research Title: *Novel Quadrotor Manipulation System*.
Supervisors: *Prof. Ahmed Abo-Ismail, EJUST – Prof. Mohamed Fanni, Mansoura University – Dr. Ahmed Ramadan, Tanta University*.

2005 – 2009 **B.Sc. in Industrial Electronics and Control Engineering**, *Faculty of Electronic Engineering, Menoufia University*, Egypt, *Grade: Excellent with honor (88.4 %)*.
Research Title: *Design and Implementation of a SCADA System for Chemical Mixer with Production Line*.

Professional Experience

2017 – Now **Postdoctoral Research Fellow**, LS2N, ECN, Nantes, France.

2016 – 2017 **Lecturer**, Department of Industrial Electronics and Control Engineering, Faculty of Electronic Engineering, Menoufia University, Egypt.

Fall 2017 **Adjunct Lecturer**, Department of Aerospace and Communications Engineering, University of Science and Technology, Zewail City for Science and Technology, Egypt.

Fall 2016 **Adjunct Lecturer**, Department of Production Engineering and Automatic Control, French University in Egypt, Egypt.

2015 – 2016 **Ph.D. Research Student**, *Namerikawa Lab*, Department of System Design Engineering, Graduate School of Science and Technology, Keio University, Japan.

2013 – 2015 **Ph.D. Graduate Student**, *Department of Mechatronics and Robotics Engineering*, School of Innovative Design Engineering, Egypt-Japan University of Science and Technology, Egypt.

2011 – 2013 **M.Sc. Graduate Student**, *Department of Mechatronics and Robotics Engineering*, School of Innovative Design Engineering, Egypt-Japan University of Science and Technology, Egypt.

2009 – 2011 **Teaching Assistant**, *Department of Industrial Electronics and Control Engineering*, Faculty of Electronic Engineering, Menoufia University, Egypt.

Research Experience

2017 – Now **ARMEN Research Group - Autonomous Robots and Control of Interactions with the Environment**, *LS2N*, ECN, France.
Valet Project: Automatic Redistribution of Car-sharing Vehicles and Parking valet

- New models of car-like vehicles platoon navigating in urban envirnments
- Design of a robust distributed control
- Design of an observer-based control
- Robust controller design for the heterogeneous platoon
- Real-time implementation

2016 – 2017 **Robotics Lab**, *Department of Industrial Electronics and Control Engineering*, Faculty of Electronic Engineering, Menoufia University, Egypt.
Multi-robot systems

- Formation Control of Multi-quadrotors
- Gazebo-based Simulator for Cooperative Aerial Manipulation System

2015 – 2016 **Namerikawa Lab**, *Department of System Design Engineering*, Graduate School of Science and Technology, Keio University, Japan.

- State Estimation and Control of a Drone based on Visual Data
- Model Predictive Control for Aerial Manipulator
- Robust Sensor-less Force Estimation and Impedance Control

2011 – 2015 **Flying Robot Lab**, *Department of Mechatronics and Robotics Engineering*, School of Innovative Design Engineering, Egypt-Japan University of Science and Technology, Egypt.

- Design and Modeling of New Quadrotor Manipulation System (QMS)
- Identification of QMS Parameters
- Estimation of QMS attitude via Data Fusion Algorithms
- State Estimation and Control of QMS
- Model Free Robust Nonlinear Control of QMS
- Novel Inverse Kinematics algorithm of QMS
- Adaptive Intelligent Control for QMS
- Implementation of QMS

Publications

Journal:

1. Ahmed Khalifa, Olivier Kermorgant, Salvador Dominguez, Philippe Martinet "Platooning of Car-like Vehicles in Urban Environments: Consensus-based Longitudinal Control Considering Actuator Dynamics, Time Delays, and Limited Communications Capabilities" in the *IEEE Transactions on Control Systems and Technology*. **Pending**
   Platooning of Car-Like Vehicles in Urban Environments: An Observer-Based Approach Considering Actuator Dynamics and Time Delays
2. Ahmed Khalifa, Olivier Kermorgant, Salvador Dominguez, Philippe Martinet "Platooning of Car-like Vehicles in Urban Environments: A New Observer-based ~~Consensus Longitudinal Control~~" in the *IEEE Transactions on Intelligent Transportation Systems*. **Accepted**
3. Ahmed Khalifa, Mohammed Fanni "Experimental Implementation of a New Non-redundant 6-DOF Quadrotor Manipulation System" in the *ISA Transactions*. **Accepted**
4. Toru Namerikawa, Yasuhiro Kuriki, Ahmed Khalifa "Consensus-based cooperative formation control for multi-quadcopter system with unidirectional network connections" in the *Journal of Dynamic Systems Measurement and Control - Transactions of the ASME*, 2018, 140(4), 044502.
5. Mohamed Fanni, Ahmed Khalifa "A New 6-DOF Quadrotor Manipulation System: Design, Kinematics, Dynamics and Control" in the *IEEE/ASME Transactions on Mechatronics*, 2017, 22(3), 1315 - 1326.
6. Ahmed Khalifa, Mohamed Fanni "A New Quadrotor Manipulation System: Modeling and Point-to-Point Task Space Control" in the *International Journal of Control, Automation and Systems*, 2017, 15(3), 1434 - 1446
7. Ahmed Khalifa, Mohamed Fanni "POSITION ANALYSIS AND CONTROL OF A NEW QUADROTOR MANIPULATION SYSTEM" in the *International Journal of Robotics and Automation*, 2016, 31(5).
8. Ahmed Khalifa, Mohamed Fanni "Position Inverse Kinematics and Robust Internal-loop Compensator-based Control of a New Quadrotor Manipulation System" in the *International Journal of Imaging and Robotics*, 2015, 16(1), 94-113.

Conference:

9. Ahmed Khalifa, Olivier Kermorgant, Salvador Dominguez, Philippe Martinet "An Observer-based Longitudinal Control of Car-like Vehicles Platoon Navigating in an Urban Environment" in the *58^{th} IEEE Conference on Decision and Control (CDC)*, Dec 2019, Nice, France.

10. Ahmed Khalifa, Olivier Kermorgant, Salvador Dominguez, Philippe Martinet "Vehicles Platooning in Urban Environments: Integrated Consensus-based Longitudinal Control with Gap Closure Maneuvering and Collision Avoidance Capabilities" in the *European Control Conference (ECC)*, Jun 2019, Naples, Italy.

11. Ahmed Khalifa, Olivier Kermorgant, Salvador Dominguez, Philippe Martinet "Vehicles Platooning in Urban Environment: Consensus-based Longitudinal Control with Limited Communications Capabilities" in the *IEEE International Conference on Control, Automation, Robotics and Vision (ICARCV)*, Nov 2018, Singapore, Singapore.

12. Ahmed Khalifa Mohamed Fanni, Toru Namerikawa "Hybrid Acceleration/Velocity-based Disturbance Observer for a Quadrotor Manipulation System" in the *International Conference on Control Applications (CCA)*, Buenos Aires, Argentina, Sept 2016, pp. 556-561.

13. Ahmed Khalifa Mohamed Fanni, Toru Namerikawa "On the Fault Tolerant Control of a Quadrotor Manipulation System via MPC and DOb Approaches" in the 55^{th} *Annual Conference of the Society of Instrument and Control Engineers of Japan (SICE)*, Tsukuba, Japan, Sept 2016, pp. 700-705.

14. Ahmed Khalifa Mohamed Fanni, Toru Namerikawa "MPC and DOb-based Robust Optimal Control of a New Quadrotor Manipulation System" in the *European Control Conference (ECC)*, Aalborg, Denmark, Jun 2016, pp. 483-488.

15. Ahmed Khalifa Mohamed Fanni, Ahmed Ramadan, Ahmed Abo-Ismail "Controller Design of a New Quadrotor Manipulation System Based on Robust Internal-loop Compensator" in the *IEEE International Conference on Autonomous Robot Systems and Competitions (ICARSC)*, Vila Real, Portugal, Apr 2015, pp. 97-102.

16. Ahmed Khalifa Mohamed Fanni, Ahmed Ramadan, Ahmed Abo-Ismail "Adaptive Intelligent Controller Design for a New Quadrotor Manipulation System" in the IEEE International Conference on Systems, Man, and Cybernetics (SMC), Manchester, United Kingdom, Oct 2013, pp. 1666-1671.

17. M. Elsamanty, Ahmed Khalifa, Mohamed Fanni, Ahmed Ramadan, Ahmed Abo-Ismail "Methodology for Identifying Quadrotor Parameters, Attitude Estimation and Control" in the IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM), Wollongong, Australia, Jul 2013, pp. 1343-1348.

18. Ahmed Khalifa, Mohamed Fanni, Ahmed Ramadan, Ahmed Abo-Ismail "Modeling and Control of a New Quadrotor Manipulation System" in the IEEE/RAS International Conference on Innovative Engineering Systems (ICIES), Alexandria, Egypt, Dec 2012, pp. 109-114.

Awards and Honors

2015 **Ph.D. Research Student Grant**, *Namerikawa Lab., Keio University*, Japan.

2014 **1^{st} rank**, *Achieving the highest GPA among all university Mechatronics and Robotics Engineering Ph.D. graduate students.*, Egypt.

2012 **1^{st} rank**, *Achieving the highest GPA among all university Mechatronics and Robotics Engineering M.Sc. graduate students.*, Egypt.

2011 **M.Sc. and Ph.D. Scholarship Grant**, *Egypt-Japan University of Science and Technology.*, Egypt.

2009 **2nd rank**, *Achieving the second highest B.Sc. grade among all the Faculty of Electronic Engineering undergraduate students*, Egypt.

Projects Participation

2017 – Now **VALET Project**, *Automatic Redistribution of Car-sharing Vehicles and Parking Valet*, L'Agence Nationale de la Recherche (ANR) funded project, France.

2014 – 2016 **HGARMS Project**, *Hybrid Ground/Aerial Robot Manipulation System*, Egypt.

Service

Reviewer Asian Journal of Control, IEEE Transactions on Industrial Electronics, International Journal of Mechanical Systems and Signal Processing, IEEE Transactions on Intelligent Vehicles, IEEE Transactions on Cybernetics, and IEEE Transactions on Industrial Informatics

Robotics Activities

- Participation in the International Design Contest (IDC) as a team supervisor.
- Member of examination committee for Mechatronics national contest held on Menoufia University.
- Participation in the Egypt-Japan Workshop on Practical Education for Mechatronics and Robotics, Egypt-Japan University for Science and Technology, Egypt, as an assistant lecturer.

Teaching Experience

Spring 2017 **Adjunct Lecturer**, *System Modeling & Linear Systems*, Department of Aerospace and Communications Engineering, University of Science and Technology, Zewail City for Science and Technology, Egypt.

Spring 2017 **Lecturer**, *Microcontrollers*, Department of Industrial Electronics and Control Engineering, Faculty of Electronic Engineering, Menoufia University, Egypt.

Spring 2017 **Lecturer**, *Machines Theory*, Department of Industrial Electronics and Control Engineering, Faculty of Electronic Engineering, Menoufia University, Egypt.

Fall 2016 **Adjunct Lecturer**, *Signal Conditioning*, Department of Production Engineering and Automatic Control, French University in Egypt, Egypt.

2009 – 2011 **Teaching Assistant**, Faculty of Electronic Engineering, Egypt.

- Nonlinear Control Systems, Electric Circuits Engineering, Training Course in Electronics, Analog Circuits, Programmable Logic Control, Process Control Engineering, Mathematics Engineering, and Microcontrollers and its applications

Languages

Arabic **Native**

English **Fluent** *TOEFL IBT: 81/120, July 2013*

French **Basic**

Techniques, Software & Instrumentation

Programming C++, MATLAB/SIMULINK

Tools ROS, Gazebo, MSC ADAMS, Protues, CATIA

Microcontroller PIC, Arduino, ARM 7

Miscellaneous Microsoft Windows, Linux, LaTeX, Microsoft Office

References

Prof. Philippe Martinet, Research Director, Inria Sophia Antipolis, France, Philippe.Martinet@inria.fr, `http://pagesperso.ls2n.fr/~martinet-p/`.

Prof. Toru Namerikawa, Namerikawa Lab, System Design Engineering Department, Keio University, Japan, namerikawa@sd.keio.ac.jp, `http://www.namerikawa.sd.keio.ac.jp/`.

Prof. Mohamed Fanni, Mechatronics and Robotics Engineering Department, E-JUST, Egypt, mohamed.fanni@ejust.edu.eg, `https://ide.ejust.edu.eg/members-mre/`.

Prof. Abdelfatah Mohamed, Mechatronics and Robotics Engineering Department, E-JUST, Egypt, abdelfatah.mohamed@ejust.edu.eg, `https://ide.ejust.edu.eg/members-mre/`.

Dr. Olivier Kermorgant, Associate Professor, École Centrale Nantes, France, olivier.kermorgant@ec-nantes.fr, `http://pagesperso.ls2n.fr/~kermorgant-o/`.