Abdelrahman Sayed Sayed Emam Ibrahim

Current position: Marie Skłodowska-Curie PhD Fellow @ ESTAS lab Université Gustave Eiffel, Lille, France

Contact information
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Research interests

- Safety verification of neural networks and AI controlled systems
- Hybrid control, formal methods, reachability analysis, metaheuristic optimization
- Risk Assessment of autonomous underwater vehicles
- Applications: autonomous underwater vehicles, multi-agent systems, robotic manipulators

Education

11/2023-present	**Université Gustave Eiffel**, Lille, France PhD thesis in Computer Science and Automatic Control Marie Skłodowska-Curie Actions (MSCA) CO-FUNDED PhD *Supervisors*: Pierre-Jean Meyer and Mohamed Ghazel (UGE, France), Asgeir Johan Sørensen (NTNU, Norway) *Thesis*: Formal verification of neural ODE for safety evaluation in autonomous vehicles
10/2021-10/2023	**Erasmus Mundus Joint Master's Degree in Marine and Maritime Intelligent Robotics (MIR)** Scholarship from European Commission (Acceptance rate: 5.9%) €47,000 in total including tuition fees, travel costs, and living allowance
08/2022-06/2023	**Norwegian University of Science and Technology**, Department of Marine Technology (IMT), Trondheim, Norway Master's in Marine Robotics Specialization: Safe autonomous subsea operations *Supervisors*: Asgeir Johan Sørensen and Ingrid Bouwer Utne *Thesis*: Risk Aware Control of Underwater Snake Robots in Confined Environments

10/2021-10/2023	**Université de Toulon**, La Garde, France Master's in Engineering of Complex Systems Résultat: 16/20 avec la mention Très Bien
09/2015-02/2020	**Nile University**, Giza, Egypt Bachelor of Engineering and Applied Sciences in Mechanical Engineering GPA: 3.75/4 "magna cum laude" *Supervisors*: Hossam Hassan Ammar and Raafat Shalaby *Thesis*: Design and Control of an 18 DOF Hexapod Multi-agent Swarm for Search and Rescue Missions
2018-2020	**Festo Authorized and Certified Training (FACT)**, Giza, Egypt FESTO Professional Diploma program in Industrial Automation and Mechatronics

Professional experience

06/2023-09/2023	**Research Intern**, ESTAS, Université Gustave Eiffel, Lille, France *Supervisor*: Pierre-Jean Meyer *Topic* : Bridging discrete and continuous neural network models
01/2023–04/2023	**Graduate Teaching Assistant**, Department of Marine Technology - Norwegian University of Science and Technology, Trondheim, Norway Teaching assistant for TMR4275 - Modelling, Simulation and Analysis of Mechatronic Systems course
06/2023-08/2022	**Summer Research Intern**, LIRMM - Explore team, Montpellier, France *Supervisor*: Lionel Lapierre *Topic* : Conception of a poly-articulated underwater robot for karstic exploration
04/2021–08/2021	**Robotics Engineer**, Plumake srl and Verona FabLab, Verona, Italy Simulating Comau e.DO anthropomorphic manipulator in Unity Designing a Tennis court AGV mobile robot
03/2020–02/2021	**STEM Curriculum Developer**, STEM HUB, Dubai, UAE Designing AI&Robotics Curriculum for UAE High school students
10/2019–02/2020	**Undergraduate Research Assistant**, Smart Engineering Systems Research Center (SESC) - Nile University, Giza, Egypt *Supervisors* : Ahmad Taher Azar, Hossam Hassan Ammar and Raafat Shalaby
07/2019–08/2019	**Maker's Trainer**, Arab Digital Expression Foundation, Cairo, Egypt 3D printing and CAD lectures Arduino and Raspberry Pi lectures
02/2019–06/2019	**Control Engineer**, Nile University and Ghabbour Auto, Giza, Egypt Erasmus+KA2 VET-ENG project Control of an Autonomous Guided Vehicle (A.G.V)
09/2018–02/2019	**Junior Teaching Assistant**, Nile University, Giza, Egypt Instructed second year engineering students by introducing programming and algorithms using numerical techniques Conducted lab sessions to aid the students in their term project

Technical Skills

Systems Engineering	Problem Identification, System Design, Verification & Validation, Risk Assessment
Computer Programming	MATLAB, Simulink, Python, C++, LabVIEW, GitHub, GitLab, Robot Operating System (ROS)
Mechanical	3D printing, Laser cutting, 3-axis milling, Lathe, SolidWorks, AutoCAD, ANSYS, MSC ADAMS
Electrical	Basic PCB Design & Manufacturing, Altium Designer, Multisim and Ultiboard
Microcontrollers	Raspberry Pi, Arduino, NI myRIO
Other	Siemens SIMATIC PLC, FESTO FluidSim, LaTeX, GeNIe Modeler

Languages

Arabic	Native
English	Fluent (IELTS score 7)
French	Professional working proficiency (B2)
Italian	Limited working proficiency (A2)

Awards

09/2023	**Second Place** at NTNU Faculty of Engineering Innovation Competition for Master thesis Awarding institution : Faculty of Engineering, Norwegian University of Science and Technology (NTNU) Awarded : **20,000 NOK**
06/2023	**Best Student Presentation** at Underwater Technology Conference "UTC 2023" Awarding institution : Underwater Technology Foundation Awarded : **10,000 NOK**
11/2020	**Best Undergraduate Research Thesis** for the academic year 2019 - 2020 Awarding institution : School of Engineering and Applied Sciences, Nile University
12/2018-12/2019	**Dean's Honor list** for the following semesters (SP'18, FA'18, SP'19) Awarding institution : Nile University
10/2016	**4th Place** in Minesweepers International competition Awarding institution : Zewail City of Science and Technology
10/2016	No Pain No Gain **special prize** in Minesweepers International competition Awarding institution : Zewail City of Science and Technology

Grants

12/2024	**Mobility grant** from MADIS Doctoral School for 2025 Awarding institution : Mathematics and Digital Sciences (MADIS) Graduate school Awarded : **€1000**
07/2024	**Travel grant** for IGSC M18: Control and Machine Learning Awarding institution : EECI-European Embedded Control Institute Awarded : **€400**
08/2023	**Travel grant** for SCIoI & ISAB Summer School Awarding institution : Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) under Germany's Excellence Strategy – EXC-2002/1 – Projectnumber 390523135 Awarded : **€400**
06/2023	**Travel grant** for OCEANS 2023 conference Awarding institution : Co-funded by the Erasmus Mundus Joint Master's Degree in Marine and maritime Intelligent Robotics (MIR) a Erasmus+ Programme of the European Union Awarded : **€500**
10/2019	**Bachelor Thesis grant** for the academic year 2019 - 2020 Awarding institutions : Graduation Projects Funding Program by Egyptian Academy of Scientific Research and Technology (ASRT) and Nile University (NU) Awarded : **€3380**: **€2340** from ASRT and **€1040** from NU

Teaching

Teaching assistant   **NTNU, Trondheim, Norway**

- *Modelling, Simulation and Analysis of Mechatronic Systems* (TMR4275), Department of Marine Technology (IMT), 2023

Teaching assistant   **Nile University, Giza, Egypt**

- *Numerical Methods for Engineers* (MATH303), School of Engineering and Applied Sciences (EAS), 2018-2019

Administration

2025	**Elected representative of PhD students** in the council of the Mathematics and Digital Sciences (MADIS) Graduate school, Université de Lille, France

Summer&Winter Schools

February 2025	Winter School on Numerical Methods for Optimal Control of Nonsmooth Systems Mines Paris-PSL, Paris, France
July 2024	IGSC: International Graduate School on Control - M18: Control and Machine Learning University of Dubrovnik, Dubrovnik, Croatia
February 2024	Set4Most: Modelling, Estimation, and Control using Set-Based Methods Centrale Lille, Villeneuve d'Ascq, France
October 2023	SAUTOS: Safe AUTOnomous Systems Université Paris-Saclay, Orsay, France
August 2023	SCIoI & ISAB Summer School Science of Intelligence (SCIoI), Berlin, Germany

Publications

Google Scholar page — ResearchGate — ORCiD — OpenReview

Theses

(T2) Abdelrahman Sayed Sayed Emam Ibrahim, **Risk Aware Control of Underwater Snake Robots in Confined Environments**, *MSc Thesis*. Department of Marine Technology, Norwegian University of Science and Technology (NTNU), Trondheim, Norway, May 2023.

(T1) Abdelrahman Sayed Sayed, **Design and Control of an 18 DOF Hexapod Multi-agent Swarm for Search and Rescue Missions**, *BSc Thesis*. School of Engineering and Applied Sciences, Nile University (NU), Giza, Egypt, February 2020.

Journals

(J1) **A. S. Sayed**, N. A. Mohamed, A. A. Salem and H. H. Ammar, **Modeling of Nonlinear 3-RRR Planar Parallel Manipulator: Kinematics and Dynamics Experimental Analysis**. *Int. J. Mech. Mechatronics Eng.*, v. 20, pp. 175-185, 2020.

Conferences

(C8) **A. S. Sayed**, Pierre-Jean Meyer and Mohamed Ghazel **Bridging Neural ODE and ResNet: A Formal Error Bound for Safety Verification**. *SAIV 2025*, Zagreb, Croatia, 2025.

(C7) A. S. Sayed, **Risk Assessment of an Autonomous Underwater Snake Robot in Confined Operations**. *OCEANS 2023 - Limerick*, Limerick, Ireland, pp. 1-9, 2023.

(C6) **A. S. Sayed**, W. K. Shaker, H. H. Ammar, A. T. Azar and C. B. Njima, **Design of a Fuzzy Type-2 Controller for 1-DOF Pitch Axis Twin Rotor System**. *International Conference on Control, Automation and Diagnosis (ICCAD)*, Rome, Italy, pp. 1-6, 2023.

(C5) **A. S. Sayed**, H. H. Ammar and R. Shalaby, **Centralized Multi-agent Mobile Robots SLAM and Navigation for COVID-19 Field Hospitals** . *2nd Novel Intelligent and Leading Emerging Sciences Conference (NILES)*, Giza, Egypt, pp. 444-449, 2020.

(C4) **A. S. Sayed**, A. A. Mohamed, A. M. Aly, Y. M. Hassan, A. M. Abdulaziz, H. H. Ammar and R. Shalaby, **Experimental Modeling of Hexapod Robot Using Artificial Intelligence**. *International Conference on Artificial Intelligence and Computer Vision (AICV2020)*, Cairo, Egypt, v. 1153, pp. 26-36, 2020.

(C3) **A. S. Sayed**, A. T. Azar, Z. F. Ibrahim, H. A. Ibrahim, N. A. Mohamed and H. H. Ammar, **Deep learning based kinematic modeling of 3-rrr parallel manipulator**. *International Conference on Artificial Intelligence and Computer Vision (AICV2020)*, Cairo, Egypt, v. 1153, pp. 308-321, 2020.

(C2) A. T. Azar, **A. S. Sayed**, A. S. Shahin, H. A. Elkholy and H. H. Ammar, **PID controller for 2-DOFs twin rotor MIMO system tuned with particle swarm optimization**. *International Conference on Advanced Intelligent Systems and Informatics (AISI2019)*, Cairo, Egypt, v. 1058, pp. 229-242, 2020.

(C1) A.T. Azar, A.M. Aly, **A.S. Sayed**, M.E. Radwan and H.H. Ammar, **Neuro-Fuzzy System for 3-DOF Parallel Robot Manipulator**. *Novel Intelligent and Leading Emerging Sciences Conference (NILES)*, Giza, Egypt, pp. 1-5, 2019.

References

PhD Thesis Supervisors

1. **Pierre-Jean Meyer**

   - Research Fellow at ESTAS laboratory, Université Gustave Eiffel, France
   - Email: pierre-jean.meyer@univ-eiffel.fr
   - Relation: PhD Thesis main supervisor

2. **Mohamed Ghazel**

   - Director of ESTAS laboratory, Université Gustave Eiffel, France
   - Email: mohamed.ghazel@univ-eiffel.fr
   - Relation: PhD Thesis co-supervisor

3. **Asgeir Johan Sørensen**

   - Relation: PhD Thesis co-supervisor

Master Thesis Supervisors

1. **Asgeir Johan Sørensen**

   - Professor of Marine Cybernetics, Department of Marine Technology, Norwegian University of Science and Technology (NTNU), Norway
   - Director Centre for Autonomous Marine Operations and Systems (NTNU AMOS)
   - Email: asgeir.sorensen@ntnu.no
   - Relation: Master Thesis main supervisor & PhD Thesis co-supervisor

2. **Ingrid Bouwer Utne**

   - Professor of Marine Safety and Maintenance Engineering, Department of Marine Technology, Norwegian University of Science and Technology (NTNU), Norway
   - Email: ingrid.b.utne@ntnu.no
   - Relation: Master Thesis co-supervisor

3. **Lionel Lapierre**

   - Professor of Underwater Robotics, ENSTA Bretagne, France
   - Email: lionel.lapierre@ensta-bretagne.fr
   - Relation: Master Thesis Internship supervisor

4. **Vincent Hugel**

   - Full Professor Université de Toulon, France
   - Head of COSMER Lab
   - Email: vincent.hugel@univ-tln.fr
   - Relation: MIR Master's Head of Studies & Main supervisor for master's 1st year

Bachelor Thesis Supervisors

1. **Hossam Hassan Ammar**

   - Assistant Professor of Mechatronics and Robotics, School of Engineering and Computer Science, University of Hertfordshire, Egypt
   - Email: h.ammar@gaf.edu.eg
   - Relation: Bachelor Thesis co-supervisor

2. **Raafat Shalaby**

   - MECT Program Director, School of Engineering and Applied Sciences, Nile University, Egypt
   - Email: rshalaby@nu.edu.eg
   - Relation: Bachelor Thesis main supervisor

3. **Ahmad Taher Azar**

   - Full Professor, Prince Sultan University, Saudi Arabia
   - Lab leader of Automated Systems & Soft Computing Lab (ASSCL), Prince Sultan University
   - Email: ahmad_t_azar@ieee.org
   - Relation: Bachelor Research supervisor