

Zeyad M. Manaa

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Education	<p>King Fahd University for Petroleum & Minerals (KFUPM) Jan. 2023 – present; Saudi Arabia <i>M.Sc. in Aerospace Engineering (Cum Laude)</i> <i>Thesis</i>¹: “Data-driven Approaches for Flight Dynamics Modeling and Control – On Linear and Non-linear Techniques for Dynamics Identification and Control”</p> <p>University of Science and Technology at Zewail City (UST-ZC) Sep. 2017 - May. 2022; Egypt <i>B.S. in Aerospace Engineering</i> <i>Thesis</i>: “Development of the software package for the attitude determination and control algorithm of a cube satellite”</p>
Interests	Data-driven modeling and control of dynamical systems – Control theory and optimization – Model reduction and feedback control of dynamical systems – Event-triggered control
Refereed publications	<p>Journal Papers</p> <p>[1] Novel Airfoil for Improved Supersonic Performance Zeyad M. Manaa, Naef A. A. Qassem <i>The International Journal of Numerical Methods for Heat and Fluid Flow</i>, 2024</p> <p>Conference Proceedings</p> <p>[2] Data-driven Discovery of The Quadrotor Equations of Motion Via Sparse Identification of Non-linear Dynamics Zeyad M. Manaa, Mohamed R. Elbalshy, Ayman M. Abdallah <i>AIAA SCITECH 2024 Forum, AIAA (p. 1308)</i></p> <p>[3] Koopman-LQR for Quadrotor UAVs from Data Zeyad M. Manaa, Ayman M. Abdallah, Mohamed A. Abido, Syed S. A. Ali <i>IEEE SM 2024</i></p> <p>[4] Optimum Configuration for Hovering N-Quadrotors Carrying a Slung Payload Mohssen M., Pansy Elkhodary, Meral Badr, Mohammed Sayegh, Zeyad M. Manaa, Ayman M. Abdallah <i>Accepted at AIAA SCITECH 2025 Forum</i></p> <p>[5] Dynamic Stability Performance Analysis of The BWB Skywalker X-8 Taha Najam, Anafi Sherifdeen Olayinka, Abdul Motayib, Moses James Kehinde, Syed S. A. Ali, Zeyad M. Manaa, Ayman M. Abdallah <i>Accepted at AIAA SCITECH 2025 Forum</i></p> <p>Preprints</p> <p>[6] KINETC: Koopman-Inspired Nonlinear Event-Triggered Control from Data Zeyad M. Manaa, Ayman M. Abdallah, Sami El-Ferik <i>Pre-print</i></p> <p>[7] Analytical Constructions of Koopman Observable Functions for Attitude Dynamics on SO(3) Manifold Zeyad M. Manaa, Ayman M. Abdallah <i>Pre-print</i></p>
Patents	<p>[8] Efficient Airfoil for Improved Supersonic Performance for Fighters Naef A. A. Qassem, Zeyad M. Manaa <i>Patent ID. 550544US. Status: filed</i></p>

¹This work is conducted with the Interdisciplinary Research Center for Aviation & Space Exploration under research grant INAE 2401. For outcomes see e.g., [1, 2], and [6, 7].

Research experience	KFUPM, Space and Aviation Electronics Lab	<i>Jan 2023 – Present; Dhahran, Saudi Arabia</i>
	<i>Research Assistant</i>	
	<ul style="list-style-type: none"> • Researching Koopman operator to globally linearize nonlinear dynamics • Exploring novel techniques for adaptive and model predictive control using new data-driven techniques • Developing data-driven event-triggered control frameworks 	
	NUST, Aerial Robotics Lab	<i>Jun 2022 – Aug 2022; Islamabad, Pakistan</i>
	<i>Research Intern</i>	
	<ul style="list-style-type: none"> • Developed an autonomous control system for a quadrotor UAV using Tello and COEX Clover devices with ROS 	
	Egyptian Space Agency, ADCS Lab	<i>Aug 2021 – Jul 2022; Cairo, Egypt</i>
	<i>Research Intern</i>	
	<ul style="list-style-type: none"> • Conducted the bachelor's thesis research under co-supervision of the Egyptian Space Agency and University of Science and Technology at Zewail City on spacecraft attitude determination and control subsystem • Developed the software of the attitude determination and control algorithm of a cube satellite which decreased the detumbling time of the cube satellite • Studied and implemented the space environment as a means of Earth's Magnetic Field (IGRF Model), Earth's gravitational field (using Spherical Harmonics) as well as modeling the space disturbances 	
Internships	EgyptAir Maintenance and Engineering	<i>Jun. 2022 – Aug. 2022; Cairo, Egypt</i>
	<i>Aircraft Maintenance Intern</i>	
	Cairo University	<i>Aug. 2021 – Jul. 2022; Cairo, Egypt</i>
	<i>Undergraduate Visiting Student – Space Systems Technology Laboratory</i>	
	Courses Taught	
	[1] AE 426 ; Fall 2023: Introduction to Flight Mechanics (Undergraduate Course)	
	[2] AE 315 ; Fall 2023: Systems and Control (Undergraduate Lab); overall evaluation: 9.56/10.0	
	Teaching Assistantships	
	[3] AE 540 ; Spring 2024: Flight Dynamics and Control I (Graduate Course)	
	Teaching-related Activities	
	[4] AE 350 – CIE 350 ; Summer 2023: Monitored undergraduate students' cooperative work in Aerospace Engineering and Control & Instrumentation Engineering Departments	
	[5] AE 399 – CIE 399 ; Summer 2023: Oversaw undergraduate students' summer internships workflow in Aerospace Engineering and Control & Instrumentation Engineering Departments	
Talks	Koopman Meets LQR for Quadcopters using Data	<i>Sep. 2024; Ontario, Canada</i>
	Host: IEEE @ OntarioTech.	
	Data-driven Modeling and Control in Aerospace Applications	<i>Mar. 2024; Dhahran, KSA</i>
	Host: KIKX @ KFUPM. (Approximately 50 attendees).	
	Data-driven Discovery of The Quadrotor Equations of Motion Via SINDy	<i>Jan. 2024; FL, USA</i>
	Host: AIAA	
	On POD and DMD for aerodynamic application	<i>May 2023; Dhahran, KSA</i>
	Host: Aerospace Department, KFUPM.	
	Convex optimization for thin airfoil design using linear flow theory	<i>Mar. 2023; Dhahran, KSA</i>
	Host: Aerospace Department, KFUPM.	
Awards	Mohammad Al-Aqeel Grant for Graduate Students	<i>KFUPM, 2023</i>
	Graduate Intl. Research Assistance Scholarship	<i>KFUPM, 2023</i>
	Research Intern Scholarship for Intl. Students	<i>NUST, 2022</i>
	Future Work is Digital Scholarship	<i>Ministry of Comm. and Info. Tech., 2022</i>
	Smart City Hackathon: 1st Place Award in global finals	<i>DAN & Global Project Germany, 2019</i>
	Undergraduate Fellowship	<i>UST-ZC, 2017</i>

Skills	Programming: Python (3 yrs.), MATLAB (4 yrs.), C++ (1.5 yrs.), Julia (basic) Frameworks: Pytorch, OpenCV, Sci-Kit, CVX/PYCVX Other skills: GIT, SolidWorks, ANSYS, Mathematica, bash-scripting, Jupyter Notebook, LaTeX Languages: Arabic (Native), English (C1, IELTS: 7)	
Services	Conference Reviewer: IEEE SMILE 2024, IEEE eSmarTA, 2024, AIAA SCITECH, 2023 – 2024	
Leadership experience	Media Committee Head, Euroavia Zewail City	Egypt, 2020
	Managed a team of 10 people for the Euroavia Egypt student branch Media Committee Head, Zewail City Science Festival Managed a team of 15 people for the Zewail City Science Festival mega event	Egypt, 2019