

Zeyad M. Manaa

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EDUCATION	King Fahd University for Petroleum & Minerals (KFUPM) 2023 – present; Saudi Arabia Dhahran, Saudi Arabia M.Sc. in Aerospace Engineering (Cum Laude) Thesis ¹ : “Data-driven Approaches for Modeling and Control in Flight Dynamics Applications – On Linear and Nonlinear Methods” University of Science and Technology at Zewail City (UST-ZC) 2017 - 2022; Egypt Giza, Egypt B.S. in Aerospace Engineering Thesis: “Development of the software package for the attitude determination and control algorithm of a cube satellite”
INTERESTS	Data-driven modeling and control of dynamical systems and system identification – Nonlinear and optimal control theory for flight dynamics – Event-triggered control
REFEREED PUBLICATIONS	Journal Papers [1] Novel Airfoil for Improved Supersonic Performance with Convex Optimization Approach Zeyad M. Manaa , Naef A. A. Qassem <i>The International Journal of Numerical Methods for Heat and Fluid Flow</i> , 2024 Conference Proceedings [2] Data-driven Discovery of The Quadrotor Equations of Motion Via Sparse Identification of Nonlinear Dynamics Zeyad M. Manaa , Mohamed R. Elbalshy, Ayman M. Abdallah <i>AIAA SCITECH 2024 Forum, AIAA (p. 1308)</i> [3] Koopman-LQR Controller for Quadrotor UAVs from Data Zeyad M. Manaa , Ayman M. Abdallah, Mohamed A. Abido, Syed S. A. Ali <i>IEEE SM 2024</i> [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> [5] Dynamic Stability Performance Analysis of The BWB Skywalker X-8 Taha Najam, Anafi Sheriffdeen Olayinka, Abdul Motayib, Moses James Kehinde, Zeyad M. Manaa , Syed S. A. Ali, Ayman M. Abdallah <i>Accepted at AIAA SCITECH 2025 Forum</i> [6] Design and Analysis of the Effect of Trimmable Vertical Stabilizers for Enhanced Aircraft Maneuverability and Directional Stability Shaik Zaidan, Najwa Z. B. Taufik, Eman Mahmoud, Zeyad M. Manaa , Ayman M. Abdallah, Ghulam Abro, Mohd Taib <i>Accepted at the IEEE Conference on Systems, Process, and Control (ICSPC) 2024</i>
PREPRINTS	[7] KOETC: Koopman Operator-Based Event-Triggered Control from Data Zeyad M. Manaa , Ayman M. Abdallah, Mohamed Ismail, Sami El-Ferik <i>Submitted to European Journal of Control</i> [8] Evaluation of Deep Learning-based Quadrotor UAV Detection and Tracking Methods

¹This work is conducted with the Interdisciplinary Research Center for Aviation & Space Exploration under research grant INAE 2401. For outcomes see e.g., [2, 3, 7].

Mohssen E. Elshaar*, **Zeyad M. Manaa***, Mohammed R. Elbalshy*, Abdul Jabbar Siddiqui, abd Ayman M. Abdallah
Engineering Applications of Artificial Intelligence

PATENTS	[9] Efficient Airfoil for Improved Supersonic Performance for Fighters Naef A. A. Qassem, Zeyad M. Manaa <i>Patent ID. 550544US. Status: filed</i>
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>Maintenance Engineering Intern [hands-off]</i> Cairo University <i>Aug. 2021 – Jul. 2022; Cairo, Egypt</i> <i>Undergraduate Visiting Student – Space Systems Technology Laboratory</i>
TEACHING	Courses Taught <ul style="list-style-type: none">[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 <ul style="list-style-type: none">[3] AE 540; Spring 2024: Flight Dynamics and Control I (Graduate Course) Teaching-related Activities <ul style="list-style-type: none">[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 Quadrotors Equations of Motion Via SINDy <i>Jan. 2024; FL, USA</i> Host: AIAA On POD and DMD for aerodynamics application <i>May 2023; Dhahran, KSA</i> Host: Aerospace Department, KFUPM.

Convex optimization for thin airfoil design using linear flow theory *Mar. 2023; Dhahran, KSA*

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 Partners, 2019</i>
	Undergraduate Fellowship	<i>UST-ZC, 2017</i>
SKILLS	Programming: Python (3 yrs.), MATLAB (4 yrs.), C++ (1.5 yrs.), Julia (basic)	
	Hardware: Quanser 3DOF hover system, CUAV autopilots, Raspberry Pi, Pixhawk	
	Frameworks: Pytorch, OpenCV, Sci-Kit, cvx/cvxpy, ArduPilot (Multi-copter), ROS	
	Other skills: GIT, SolidWorks, ANSYS, Mathematica, bash-scripting, \LaTeX	
	Languages: Arabic (Native), English (C1, IELTS: 7 [<i>test date: Dec, 2021</i>])	
SERVICES	Conference Reviewer: IEEE SMILE 2024, IEEE eSmarTA, 2024, AIAA SCITECH, 2023 – 2024	
LEADERSHIP	Media Committee Head, Euroavia Zewail City	<i>Egypt, 2020</i>
EXPERIENCE	Managed a team of 10 people for the Euroavia Egypt student branch	
	Media Committee Head, Zewail City Science Festival	<i>Egypt, 2019</i>
	Managed a team of 15 people for the Zewail City Science Festival mega event	