Zeyad M. Manaa

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Education	**King Fahd University for Petroleum & Minerals (KFUPM)** *Dhahran, Saudi Arabia*

M.Sc. in Aerospace Engineering (Cum Laude)
Thesis[1]:"Data-driven Approaches for Flight Dynamics Modeling and Control – On Linear and Nonlinear Techniques for Dynamics Identification and Control"

University of Science and Technology at Zewail City (UST-ZC) *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
The International Journal of Numerical Methods for Heat and Fluid Flow, 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
AIAA SCITECH 2024 Forum, AIAA (p. 1308)

[3] Koopman-LQR for Quadrotor UAVs from Data
Zeyad M. Manaa, Ayman M. Abdallah, Mohamed A. Abido, Syed S. A. Ali
IEEE SM 2024

[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
Accepted at AIAA SCITECH 2025 Forum

[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
Accepted at AIAA SCITECH 2025 Forum

[6] Design and Analysis of the Effect of Trimmable Vertical Stabilizers for Enhanced Aircraft Maneuverability and Directional Stability
Shaik Zaidaan, Najwa Z. B. Taufik, Eman Mahmoud, **Zeyad M. Manaa**, Ayman M. Abdallah, Ghulam Abro, Mohd Taib
Accepted at the IEEE Conference on Systems, Process, and Control (ICSPC) 2024

Preprints

[7] KINETC: Koopman-Inspired Nonlinear Event-Triggered Control from Data
Zeyad M. Manaa, Ayman M. Abdallah, Sami El-Ferik

[8] Evaluation of Deep Learning-based Quadrotor UAV Detection and Tracking Methods
Mohssen E. Elshaar*, **Zeyad M. Manaa***, Mohammed R. Elbalshy*, and Abdul Jabbar Siddiqui

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Patents	[9] Efficient Airfoil for Improved Supersonic Performance for Fighters Naef A. A. Qassem, **Zeyad M. Manaa** *Patent ID. 550544US. Status: filed*

Research experience	**KFUPM, Space and Aviation Electronics Lab** *Jan 2023 – Present; Dhahran, Saudi Arabia* *Research Assistant* • 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** *Jun 2022 – Aug 2022; Islamabad, Pakistan* *Research Intern* • Developed an autonomous control system for a quadrotor UAV using Tello and COEX Clover devices with ROS **Egyptian Space Agency, ADCS Lab** *Aug 2021 – Jul 2022; Cairo, Egypt* *Research Intern* • 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** *Jun. 2022 – Aug. 2022; Cairo, Egypt* *Aircraft Maintenance Intern* **Cairo University** *Aug. 2021 – Jul. 2022; Cairo, Egypt* *Undergraduate Visiting Student – Space Systems Technology Laboratory*

Teaching	**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** *Sep. 2024; Ontario, Canada* Host: IEEE @ OntarioTech. **Data-driven Modeling and Control in Aerospace Applications** *Mar. 2024; Dhahran, KSA* Host: KIKX @ KFUPM. (Approximately 50 attendees). **Data-driven Discovery of Quadrotors Equations of Motion Via SINDy** *Jan. 2024; FL, USA* Host: AIAA **On POD and DMD for aerodynamics application** *May 2023; Dhahran, KSA* 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**	*KFUPM, 2023*
	Graduate Intl. Research Assistance Scholarship	*KFUPM, 2023*
	Research Intern Scholarship for Intl. Students	*NUST, 2022*
	Future Work is Digital Scholarship	*Ministry of Comm. and Info. Tech., 2022*
	Smart City Hackathon: 1st Place Award in global finals	*DAN & Global Project Partners, 2019*
	Undergraduate Fellowship	*UST-ZC, 2017*

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/PYCVX, ArduPilot (Multi-copter), ROS
	Other skills: GIT, SolidWorks, ANSYS, Mathematica, bash-scripting, 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	Egypt, 2019
	Managed a team of 15 people for the Zewail City Science Festival mega event	