

Zeyad M. Manaa

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<https://zmanaa.github.io/>

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| Education | King Fahd University for Petroleum & Minerals (KFUPM) <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 Nonlinear Techniques for Dynamics Identification and Control” University of Science and Technology at Zewail City (UST-ZC) <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” | <i>Dhahran, Saudi Arabia</i> <i>Giza, Egypt</i> |
| 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 | 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</i> , AIAA (p. 1308) [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> [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, Syed S. A. Ali, Zeyad M. Manaa , Ayman M. Abdallah <i>Accepted at AIAA SCITECH 2025 Forum</i> | |
| Preprints | [6] KINETC: Koopman-Inspired Nonlinear Event-Triggered Control from Data Zeyad M. Manaa , Ayman M. Abdallah, Sami El-Ferik [7] Analytical Costructions of Koopman Observable Functions for Attitude Dynamics on SO(3) Zeyad M. Manaa , Ayman M. Abdallah [8] Evaluation of Deep Learning-based Quadrotor UAV Detection and Tracking Methods Mohssen E. Elshaar*, Zeyad M. Manaa *, Mohammed R. Elbalshy*, Abdul Jabbar Siddiqui, and Ayman M. Abdallah | |
| Patents | [9] Efficient Airfoil for Improved Supersonic Performance for Fighters Naef A. A. Qassem, Zeyad M. Manaa <i>Patent ID: 550544US. Status: filed</i> | |

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, 6, 7].

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| 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 | |
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| 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> | |
| 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 | <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 | <i>Mar. 2023; Dhahran, KSA</i> |
| | Host: Aerospace Department, KFUPM. | |

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| 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, \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 | <i>Egypt, 2020</i> |
| | 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 | |