Zeyad M. Manaa

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LinkedIn, GitHub, Scholar
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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 – 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
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, Syed S. A. Ali, **Zeyad M. Manaa**, Ayman M. Abdallah
Accepted at AIAA SCITECH 2025 Forum

Preprints

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

[7] Analytical Costructions of Koopman Observable Functions for Attitude Dynamics on SO(3) Manifold
Zeyad M. Manaa, Ayman M. Abdallah
Pre-print

[8] Drone or Not? Quadrotor UAV Detection and Tracking
Mohssen E. Elshaar⋆, **Zeyad M. Manaa**⋆, Mohammed R. Elbalshy⋆, Ayman M. Abdallah,

[1] This 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].

and Abdul Jabbar Siddiqui
Pre-print

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 The Quadrotor 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 Germany, 2019*
Undergraduate Fellowship *UST-ZC, 2017*

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 Egypt, 2019
Managed a team of 15 people for the Zewail City Science Festival mega event