Zeyad M. Manaa

Department of Aerospace Engineering,
King Fahd University for Petroleum and Minerals, Dhahran, 31261, Saudi Arabia
LinkedIn, GitHub, Scholar
https://zmanaa.github.io/

Education

King Fahd University for Petroleum & Minerals (KFUPM) *Jan. 2023 – present; 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) *Sep. 2017 - May. 2022; 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
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

Patents

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

[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], and [6, 7].

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 aerodynamic 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