

Professional Profile

- Progressive Engineer having over 5 years of experience as an Aerospace engineer in control systems and attitude control design
- Computer Proficiencies include: Python, MATLAB, Simulink, AutoCAD, C#, Unity3D, STK (Systems Tool Kit), EES (Engineering Equation Software), ABAQUS, ANSYS, AAA (Advanced Aircraft Analysis Software), Digital Datcom
- Strong experience in spacecraft dynamics modeling, Kalman Filter, simulation and verification with MATLAB/Simulink
- Possesses in-depth background in space mission geometry modelling & simulation
- Working knowledge of development of Arduino-based Embedded systems
- Demonstrated strong skills in technical documentation and presentation, written and oral communication and proactive problem-solving

Education

MSc in Mechanical Engineering

Sep 2019 — August 2022

University of Manitoba, Winnipeg, MB

Dissertation topic: Attitude Control of an Underactuated LEO CubeSat in presence of Uncertainties with State Estimation; Supervisor: Dr. Philip Ferguson

- Course work: Systems Modeling and Simulation with Unity 3D software, Spacecraft Dynamics and Control, Agent-based Modeling with Netlogo software, Space Systems Engineering
- Developed a bootstrap nonlinear simulation in Simulink for attitude control of a spin stabilized CubeSat actuated with magnetorquers to achieve three-axis stabilization in the orientation needed
- Developed a robust control toolbox with three magnetorquers, a three-axis gyroscope, a three-axis magnetometer and a two-axis sun sensor
- Developed the spacecraft kinematics based on quaternion
- Presented a precise environmental perturbations block including unknown dynamics
- Identification of a reduced order state-space taking 2DOF sunsensors into consideration
- An Extended Kalman Filter (EKF) design for state estimation in and outside eclipse with 3 inputs and innovative dimension reduction technique which improved the attitude accuracy to 0.18 (deg)
- Designed an innovative control switching scenario for the CubeSat space mission
- Power simulations to determine the power consumption and the power generation, in the nominal mode and the worst case

MSc in Aerospace Engineering

Sep 2015 — Jan 2018

University of Tehran, Tehran, Iran

Dissertation topic: Optimal Robust Fuzzy and Sliding Mode Controllers Design for Attitude Control of Geostationary Satellite with Statistical Optimization Analysis; Supervisor: Dr. Mahdi Fakoor; Thesis grade: Excellent

- Presented a novel adaptive Fuzzy-PID controller for attitude control of a geostationary satellite actuated by a momentum wheel and 3 thrusters
- Design and comparison of 4 different controllers; sliding mode controller, fuzzy controller, adaptive fuzzy-PID controller and robust adaptive fuzzy PID controller
- Design of a supervisory controller to ensure the stability of the closed-loop control system
- Multi-objective genetic algorithm (MOGA) used to obtain the optimum values of the fuzzy RAPID control gains and the learning rates of adaptation laws

BSc in Aerospace Engineering

Sep 2008 — Sep 2015

Amirkabir University of Technology (Polytechnic of Tehran), Tehran, Iran

Dissertation topic: Analysis of the main systems of GE-CF6-80A3 turbofan Engine; Supervisor: Dr. Hossein Khaleghi; Thesis grade: Excellent

- Analysis of the main subsystems (classic, emergency and supply) of the GE-CF6 series turbofan engine

- Created an educational set with the GE-CF6-80A3 Turbofan Engine, with a 3-month training background in Iran Air
- Creatively labelled all pneumatic, lubrication, ventilation, fuel and ignition lines with standing banners to complete the educational set for Engine Workshop Course
- Assembly and integration plan for graduate students who researched turbofan engines
- Supervised a group of 8 undergraduate junior volunteer students while creating the educational set

Professional Experiences

ADCS Lead

Aug 2022 – Ongoing

Supervisors: Dr. Philip Ferguson and Dr. Witold Kinsner

UMSATS, Mechanical Engineering Dept., University of Manitoba, Winnipeg, MB

- Developed a bootstrap nonlinear simulation in Simulink for attitude control of a CubeSat actuated with magnetorquers and reactions wheels for slew maneuvers
- Engage in PCB design of the ADCS main board and sun sensors
- CDR presentation in CSDC competition
- Supporting the team in the preparation of academic papers

Graduate Research Assistant

Sept 2019 – Aug 2022

StarLab, Mechanical Engineering Dept., University of Manitoba, Winnipeg, MB

ADCS Lead

Oct 2019 – Sept 2021

StarLab, Mechanical Engineering Dept., University of Manitoba, Winnipeg, MB

- Attitude Determination and Control Subsystem (ADCS) Lead of Iris CubeSat (previously known as Manitoba Satellite)
- Collaborated with ADCS hardware team to create an integrated design for ADCS software
- Developed a high-fidelity simulator for attitude determination and control including orbit propagator, environmental perturbations, sensors noises, and actuator constraints
- Modified, created & maintained ADC subsystem level requirements
- Created the manufacturing, assembly and test plans for ADC subsystem
- Communicated with multidisciplinary team of mechanical and electrical leads to verify the requirements and research and development of new algorithms and solutions
- Presented the Iris CubeSat's Pre-CDR and CDR for CSA (Canadian Space Agency) members

Teacher Assistant (Part time)

Jan 2020 – Ongoing

University of Manitoba, Winnipeg, MB

- Teaching Assistant in Dynamics and Kinematics Course in Mechanical Engineering Department for 6 consequent semesters
- Support the advisors in providing individual attention to the students during group tutorial sessions and office hours
- Verify and track attendance of students, observe student performance, contribute to reports, and maintain records as required

Membership Development and Webmaster Chair (Volunteer)

Jan 2020 — Ongoing

IEEE Winnipeg, MB

- Share and demonstrate to future members the real value and benefit of IEEE membership and help in senior membership elevation
- Coordinate IEEE day event in 2020 and 2022
- Monitored and managed the IEEE memberships within COVID time which resulted in meeting recruitment and retention goals for two consecutive years
- Managing the registration desk at IEEE WiSEE 2022 conference

System Engineer (Contract Part time)

Feb 2016 — Aug 2016

Vehicle Technology Research Institute, Amirkabir University of Technology, Tehran, Iran

- System engineer and member of control subsystem of the first national HEV Design Team (Hybrid Dena Sedan) in a Concurrent Engineering Environment
- Created & maintained all subsystem level requirements upon European and Iranian standards

- Collaborated with other subsystems for group reports

GE-CF6 Turbofan Engine System Analyzer (Internship)

Jun 2015 — Sep 2015

Iran Air, Tehran, Iran

- Successfully completed an internship and conducted a research study on the main systems of GE-CF6-50,-80A1-A3 turbofan Engines

Product Assurance Analyzer (Internship)

Jun 2013 — Nov 2013

AUT SAT (Amirkabir University of Technology Satellite), Tehran, Iran

- Successfully conducted research study in Product Assurance Section on OSHA (Operation and Support Hazard Analysis) in the field of Satellites. Further created a sample template of OSHA tasks and work packages for AUT SAT.

Publications

Najafizadeh Sari, Naeimeh; and Philip Ferguson. “*A Power Management Strategy for attitude control of Spacecraft with state estimation*”, In Submission

Najafizadeh Sari, Naeimeh; Ferguson, Philip. “*A Reduced Order Extended Kalman Filter for Solar Position Estimation*”, RFID Journal, January 2023

Najafizadeh Sari, Naeimeh; Toidjanov, Alina; Ferguson, Philip. “*A Reduced Order Extended Kalman Filter for Solar Position Estimation*”, 10th Annual IEEE International Conference on Wireless for Space and Extreme Environments (WISEE 2022), Winnipeg, MB, Canada

Najafizadeh Sari, Naeimeh; Clark, Ryan; Connell, Stephanie; Turenne, Nathalie; Ferguson, Philip. “*Spin Stabilized Sun Pointing CubeSat For Space Geology*”, 16th International Conference on Space Operations, Cape Town, South Africa – 3 - 5 May 2021.

Najafizadeh Sari, Naeimeh; Jahanshahi, Hadi; Fakoor, Mahdi. “*Adaptive Fuzzy PID Control Strategy for Spacecraft Attitude Control*”, International Journal of Fuzzy Systems, 21 (3) (2019): 769-781.

Najafizadeh Sari, Naeimeh; Jahanshahi, H., Fakoor, M., Volos, C., & Nikpey, P. (2020). “*Optimal robust control approaches for a geostationary satellite attitude control*”. International Journal of Automation and Control, 14(3), 333-354, <https://doi.org/10.1504/IJAAC.2020.107090>

Jahanshahi, Hadi; and **Najafizadeh Sari, Naeimeh.** “*Robot path planning algorithms: A review of theory and experiment.*” arXiv preprint arXiv:1805.08137 (2018).

Jahanshahi, Hadi; Jafarzadeh, Mohsen; **Najafizadeh Sari, Naeimeh;** Pham, Viet Thanh; Van Huynh, Van; Quynh Nguyen, Xuan. “*Robot Motion Planning in an Unknown Environment with Danger Space*”. Electronics, 8 (2) (2019).

Jahanshahi, Hadi; Rajagopal, Karthikeyan; Akgul, Akif; **Najafizadeh Sari, Naeimeh;** Namazi, Hamidreza; Jafari, Sajad. “*Complete analysis and engineering applications of a megastable nonlinear oscillator*”. International Journal of Non- Linear Mechanics, 107 (2018): 126-136.

Jahanshahi, Hadi; **Najafizadeh Sari, Naeimeh.** “*On the performance of higher order controllers: adaptive robust PID controller subject to sliding modes*”. SICE International Symposium on Control System. Tokyo, Japan, 2018.

Honors

Scholarship for AI Programming with Python nanodegree

Nov 2022

AWS and Intel

Fellowship for Graduate Studies

Aug 2019

CSA (Canadian Space Agency) and NSERC

Best MSc thesis Award – Aerospace Engineering

Feb 2019

Iranian Aerospace Society, Tehran, Iran

Best BSc Thesis Award – Aerospace Engineering

Feb 2017

Iranian Aerospace Society, Tehran, Iran