Gregorio Marchesini

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Education

KTH Royal Institute of Technology **March 2023 - present**
Doctoral student, Intelligent and Autonomous systems, Division of Decision and Control Systems *Stockholm,Sweden*

TuDelft Delft University of Technology **August 2021 - January 2022**
Exchange program : Master of Science in Aerospace Engineering, Space exploration track *Delft,Netherlands*

KTH Royal Institute of Technology **August 2020 - December 2022**
Master of Science in Aerospace Engineering, Space Engineering track *Stockholm,Sweden*

University of Bologna **September 2017 - July 2020**
Bachelor of Science in Aerospace Engineering *Forli, Italy*

Research and Work experience

C.I.R.I Aerospace **February 2020 - June 2020**
Internship *Forli,Italy*

- The research project focused on the evaluation of the Wavelet Decomposition method as possible tool for recovering temporal *doppler* shift information for Deep Space communication operations

KTH Royal Institute of Technology **February 2022 - present**
Research Assistant at The Space and plasma physics department *Stockholm, Sweden*

- Analysis of the Lyman Alpha radiation features from the Jovian moon Ganymede. The analysis aimed at detecting possible radiation anomalies related to water plumes escaping from Ganymede. I worked under the supervision of professor Lorenz Roth.

MIST-MIniature Student saTellite **January 2021 - May 2021**
Attitude Determination and Control System team member *Stockholm, Sweden*

- As AOCS engineer in the project, I analysed compared and implemented different calibration algorithms as possible solutions for the MIST's on-board magnetometer calibration

Rocket Factory Augsburg **October 2022 - December 2022**
Attitude Determination and Control System team member *Augsburg, Germany*

- I developed different orbit propagation and attitude control routines for the maiden flight of the RFA1 launcher which will occur in 2024.

SymAware project **March 2023 - Present**
Researcher *Stockholm, Sweden*

- The SymAware project is an EU-funded project with the goal of developing different notions of situational awareness for multi-agent systems involving autonomous systems as well as human interacting in the same environment. I contribute to the project by developing theoretical and algorithmic solutions for multi-agent systems planning and control under spatio-temporal and communications constraints.

Projects

Master's Thesis project in Aerospace Engineering **February 2022 - October 2022**
Inspection of orbital structures *Stockholm,Sweden*

- The project involves the development of an MPC controller with guaranteed safety through Control Barrier Functions constraints for a prototype inspection mission of the outer structure of the International Space Station by means of a fleet of CubeSats. The result of the thesis was published at the Conference on Decision and Control 2023

Space Debris Removal preliminary mission design **September 2021 - October 2021**
Team : G. Marchesini, K. Lamboley, M. Svalstedt, M. Tjernström, W. Lannhard *Stockholm,Sweden*

- Research on state-of-the-art solutions for space debris removal
- Design of launch system simulator
- Development of orbital mechanics and cost analysis for the mission

Technical Skills

Programming: Python, MATLAB, C++, Latex, Excel, Arduino
Software and collaboration platforms: SolidEdge, XLFR5, GitHub, GHOST
Languages: Italian, English

Publications

Marchesini G, Liu S, Lindemann L, Dimarogonas DV. Sampling-based planning under spatio-temporal constraints: A Forward Invariance approach. Under preparation.

Marchesini G, Liu S, Lindemann L, Dimarogonas DV. A Communication Consistent Approach to Signal Temporal Logic Task Decomposition in Multi-Agent Systems. Under revision for Transactions on Automatic Control

G. Marchesini, S. Liu, L. Lindemann and D. V. Dimarogonas, "Decentralized Control of Multi-Agent Systems Under Acyclic Spatio-Temporal Task Dependencies," 2024 IEEE 63rd Conference on Decision and Control (CDC), Milan, Italy, 2024, pp. 5211-5217,

G. Marchesini, S. Liu, L. Lindemann and D. V. Dimarogonas, "Communication-Constrained STL Task Decomposition Through Convex Optimization," 2024 American Control Conference (ACC), Toronto, ON, Canada, 2024, pp. 3517-3523.

Roth, L., Marchesini, G., Becker, T.M., Hoeijmakers, H.J., Molyneux, P.M., Retherford, K.D., Saur, J., Mogan, S.R.C. and Szalay, J.R., 2023. Probing Ganymede's atmosphere with HST Lyα images in transit of Jupiter. The Planetary Science Journal, 4(1), p.12.

G. Marchesini, P. Roque and D. V. Dimarogonas, "Corridor MPC for Multi-Agent Inspection of Orbiting Structures," 2023 62nd IEEE Conference on Decision and Control (CDC), Singapore, Singapore, 2023, pp. 5765-5771,