

## Dr. Daniel Selva

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### CONTACT INFORMATION

Associate Professor  
Aerospace Engineering  
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### RESEARCH INTERESTS

**Space systems, systems engineering, artificial intelligence (AI), and human-machine teaming:** global and multi-objective optimization, knowledge representation and reasoning, planning and scheduling, AI assistants, human-AI interaction, multi-agent systems, spacecraft autonomy, Earth observation, satellite remote sensing, satellite communications, small satellites, CubeSats.

### ACADEMIC APPOINTMENTS

<b>Associate Professor</b>	Sep 2023 to Present
Aerospace Engineering, Texas A&M University	
<b>Assistant Professor</b>	May 2018 to Present
Aerospace Engineering, Texas A&M University	
<b>Assistant Professor</b>	July 2014 to May 2018
Sibley School of Mechanical and Aerospace Engineering, Cornell University	
<b>Faculty Fellow</b>	July 2014 to May 2018
Atkinson Center for a Sustainable Future, Cornell University	
<b>Faculty Fellow</b>	July 2014 to July 2017
Mario Einaudi Center for International Studies, Cornell University	
<b>Adjunct Assistant Professor</b>	July 2013 to July 2014
Sibley School of Mechanical and Aerospace Engineering, Cornell University	
<b>Postdoctoral Associate</b>	June 2012 to July 2014
Department of Aeronautics and Astronautics, Massachusetts Institute of Technology	

### EDUCATION

**Massachusetts Institute of Technology**, Cambridge, MA

Ph.D., Aeronautics and Astronautics, June 2012

- Dissertation: *Rule-based System Architecting of Earth Observation Satellite Systems*. Committee: Prof. **Ed Crawley** (Chair, AA), Prof. Dave Miller (AA), Prof. Ron Prinn (EAPS), Prof. Dave Staelin (EECS), Dr. Chris Scolese (NASA).
- Major: Space Systems. Minor: Earth Science

**Ecole Nationale Supérieure de l'Aéronautique et de l'Espace**, Toulouse, France

*Diplôme d'Ingénieur*, Aeronautics and Astronautics, August 2004

- Thesis Topic: *A statistical model for aerodynamic losses in jet blades as a function of airfoil geometry*. Advisor: Dr. Alain Carrère
- Major: Aircraft design. Minor: Propulsion and Aerodynamics

**Universitat Politècnica de Catalunya**, Barcelona, Spain

*Ingeniero Superior*, Electrical (Telecommunications) Engineering, August 2004

- Specialization in Communications (emphasis on electromagnetics, radiation, antennas, and remote sensing)

### INDUSTRY EXPERIENCE

**Arianespace**, Kourou, French Guiana

*Operational Engineer*

**September 2004 to September 2008**

- Member of the Ariane 5 Launch team. Successfully launched 21 Ariane 5, including the first launch of three new versions: A5ECA, A5GS, A5ES.
- Ariane 5 Assistant to the Ground Facilities Manager: During launch campaigns, management of the teams performing operations on the ground facilities including transfers of the launch vehicle + launch table from integration facility to launch pad (50+ people team).
- Ariane 5 GNC/Avionics Specialist: During launch campaigns, conducted or supervised all operations of the flight control subsystem: on-board computer, IMU, gyroscopes, MIL-STD-1553 buses, sensors (e.g. pressure, temperature, vibrations, shocks, displacement), actuators. This included participating in the resolution of technical anomalies appearing during campaigns.
- Ground software generation manager: Between launch campaigns, responsible for the technical and financial management of the ground software generation team (5-7 people team). Approval of all proposals for modification and oversight of all technical anomalies regarding ground software.
- Resident technical expert on the electrical test beds and simulators of the Ariane 5 rocket.

**Electronic Data Systems (now Hewlett-Packard)**, Barcelona, Spain

*Network Management*

**January 1999 to March 2002**

- Monitoring and control of la Caixa's IT network (4000+ branches, 8000+ ATM, servers, routers).

CONSULTING  
EXPERIENCE

**Nu Orion**, New York, NY

*Board of Advisors*

**January 2014 to July 2014**

- Technical expertise in application of complex simulation and optimization problems to wealth management.

**Cambrian Innovation**, Cambridge, MA

*External consultant*

**September 2010 to December 2012**

- Technical expertise in application of complex simulation and optimization problems to bioelectromechanical systems.

BOOKS

1. Crawley, E. F., Cameron, B., and **Selva, D.**, *Systems Architecture: Strategy and product development for complex systems*. Prentice Hall. 2015.

JOURNAL PAPERS

28. B. Gorr, **D. Selva**, H. Gao, E. Ellis, J. Morgan, M. Stroud, Y. Li, and G. Allen. Design of a Satellite Constellation for Monitoring Inland Water Quality. *Acta Astronautica*. Accepted March 30, 2024.
27. G. Apaza and **D. Selva**. Leveraging large language models for tradespace exploration. *Journal of Spacecraft and Rockets*. Accepted Jan 28 2024.
26. M. Stroud, G. Allen, M. Simard, D. Jensen, B. Gorr, and **D. Selva**. Optimizing satellite mission requirements to measure total suspended solids in rivers. *IEEE Transactions on Geoscience and Remote Sensing*. Accepted 29 November, 2023.

25. R. S. Kumar, S. Srivatsa, E. Baker, M. Silberstein, and **D. Selva**. Identifying and Leveraging Promising Design Heuristics for Multiobjective Combinatorial Design Optimization. *Journal of Mechanical Design*. Accepted August 4 2023.
24. B. Gorr, V. Ravindra, A. Aguilar Jaramillo, S. Nag, M. Moghaddam, and **D. Selva**. Multi-Objective Optimization of an Intelligent Soil Moisture Monitoring Satellite Constellation. *Journal of Spacecraft and Rockets*. Accepted Feb 17 2023.
23. A. M. Chaudhari and **D. Selva**. Evaluating Designer Learning and Performance in Interactive Deep Generative Design. *Journal of Mechanical Design*. Vol 145(5): pp. 051403. DOI: 10.1115/1.4056374. 2023.
22. P. Garcia-Buzzi and **D. Selva**. Multi-objective evolutionary formulations for design of hybrid Earth observing constellations. *Acta Astronautica*. Volume 200, 2022, Pages 420-434. DOI: 10.1016/j.actaastro.2022.08.013. 2022.
21. S. Srivatsa, R. S. Kumar, **D. Selva** and M. N. Silberstein. Examining the Impact of Asymmetry in Lattice-Based Mechanical Metamaterials. *Mechanics of Materials*. Vol. 172, 104386. DOI: 10.1016/j.mechmat.2022.104386. 2022.
20. S. Santini De Leon, D. W Way, and **D. Selva**. Improving Rule Mining for Entry, Descent, and Landing Simulations using Knowledge Graphs. *AIAA Journal of Aerospace Information Systems*. Vol. 19, No. 9 (2022), pp. 598-612 DOI: abs/10.2514/1.I011063
19. F. Pereira, P. Reed, and **D. Selva**. Multi-objective design of a Lunar GNSS. *NAVIGATION: Journal of the Institute of Navigation* March 2022, Vol. 69 (1). DOI: 10.33012/navi.504. 2022.
18. P. Garcia-Buzzi, **D. Selva** and M. Sanchez-Net. Autonomous Delay Tolerant Network Management Using Reinforcement Learning. *AIAA Journal of Aerospace Information Systems*. Vol 18(7), pp. 404-416. DOI: 10.2514/1.I010920. 2021.
17. F. Pereira and **D. Selva**. Tradespace analysis of GNSS Space Segment Architectures. *IEEE Transactions on Aerospace and Electronic Systems*. Vol. 57(1), pp. 155–174. DOI: 10.1109/TAES.2020.3010666. 2021.
16. H. Bang and **D. Selva**. Discovering generalized design knowledge using a multi-objective evolutionary algorithm with generalization operators. *Expert Systems with Applications*. Vo. 143, 1 April 2020, p. 113025. DOI: 10.1016/j.eswa.2019.113025.2020.
15. A. Viros i Martin and **D. Selva**. Daphne: A Virtual Assistant for Designing Earth Observation Distributed Spacecraft Missions. *IEEE Journal on Selected Topics in Applied Earth Observations and Remote Sensing*. Vol. 13 (2019), pp. 30–48. DOI: 10.1109/JSTARS.2019.2948921. 2019.
14. P. Garcia Buzzi, **D. Selva**, N. Hitomi, and W. J. Blackwell. Assessment of constellation designs for earth observation: Application to the TROPICS mission. *Acta Astronautica*. Vol. 161 (August 2019), pp. 166–182. DOI: 10.1016/j.actaastro.2019.05.007.2019.
13. N. Hitomi, H. Bang, and **D. Selva**. Adaptive Knowledge-Driven Optimization for Architecting a Distributed Satellite System. *AIAA Journal of Aerospace Information Systems*. Vol. 15, No. 8, pp. 485–500. DOI: 10.2514/1.I010595. 2018.
12. X. Gallud Cidoncha and **D. Selva**. Agent-based simulation framework and consensus algorithm for observing systems with adaptive modularity. *Systems Engineering*. Vol. 21, Issue 5 (September 2018), pp. 432–454. DOI: 10.1002/sys.21433. 2018.

11. N. Hitomi and **D. Selva**. Incorporating Expert Knowledge Into Evolutionary Algorithms with Operators and Constraints to Design Satellite Systems. *Applied Soft Computing*. Vol. 66, pp.330–345. DOI: 10.1016/j.asoc.2018.02.017. 2018.
10. C. Araguz, M. Mari, **D. Selva**, E. Bou-Balust, and E. Alarcon. Design Guidelines for General-Purpose Payload-Oriented Nano-Satellite Software Architectures. *AIAA Journal of Aerospace Information Systems*, Vo. 15, No. 3 (2018), pp. 107–119. DOI: 10.2514/1.I010537. 2018.
9. **Selva, D.**, Golkar, A., Korobova, O., I. LLuch-i-Cruz, P. Collopy and O. De Weck (2017). Distributed and Federated Satellite Systems: What is Needed to Move Forward? *Journal of Aerospace Information Systems*. Vol. 14(8), pp. 412–438. DOI: 10.2514/1.I010497. 2017.
8. **D. Selva**, B. Cameron and E.F. Crawley. Patterns in System Architecture Decisions. *Systems Engineering*. Vol. 19(6), pp. 474–497. DOI: 10.1002/sys.21370. 2016.
7. N. Hitomi and **D. Selva**. A Classification and Comparison of Credit Assignment Strategies in Multiobjective Adaptive Operator Selection. *IEEE Transactions on Evolutionary Computation*. Vol. 21(2). pp 294–314. DOI: 10.1109/TEVC.2016.2602348.2016.
6. N. Knerr and **D. Selva**. Cityplot: Visualization of high-dimensional design spaces with multiple criteria. *ASME Journal of Mechanical Design*, Vol. 138(9), pp. 091403–091403-9. 2016. DOI:10.1115/1.40339873
5. M. Sanchez, I. Del Portillo, B. Cameron, E.F. Crawley and **D. Selva**. Integrated Tradespace Analysis of Space Network Architectures. *AIAA Journal of Aerospace Information Systems*, Vol 12(8), pp. 564–578. 2015. DOI: 10.2514/1.I010356
4. **D. Selva**, B. Cameron, and E.F. Crawley. Rule-based System Architecting of Earth Observing Systems: The Earth Science Decadal Survey. *AIAA Journal of Spacecraft and Rockets*, Vol. 51(5), pp. 1505–1521. 2014. DOI: 10.2514/1.A32656
3. **D. Selva**, B. G. Cameron, and E.F. Crawley. A Rule-Based Method for Scalable and Traceable Evaluation of System Architectures. *Research in Engineering Design*, Vol. 25(4), pp. 325.-349. 2014. DOI: 10.1007/s00163-014-0180-x
2. **Selva, D.**, and Krejci, D. Survey and assessment of the capabilities of Cube-sats for Earth observation. *Acta Astronautica*, Vol. 74 (May-June 2012):50–68. 2012 (**Most cited article published in the journal since 2012**). DOI: 10.1016/j.actaastro.2011.12.014
1. M. Vall-llossera, A. Camps, I. Corbella, F. Torres, N. Duffo, A. Monerris, R. Sabia, **D. Selva**, C. Antolin, E. Lopez-Baeza, J. Ferran Ferrer and K. Saleh. SMOS REFLEX 03: L-band emissivity characterization of vineyards. *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 43(5). 2005. DOI: 10.1109/TGRS.2005.844102

JOURNAL PAPERS  
UNDER REVIEW

4. B. Gorr, A. Aguilar, H. Gao, D. Selva, A. Mehta, Y. Sun, V. Ravindra, C. David, G. Allen. Decentralized Reactive Satellite Constellation Planning for Event Observation. *Journal of Spacecraft and Rockets*. Under review (first submitted May 18, 2024).
3. G. Apaza, D. Selva. Improving Metamodeling of Rule-Based Expert Systems for Design Evaluation with Transformers. *Journal of Mechanical Design*. Under review (first submitted May 17, 2024).

2. P. K. Josan, P. Dutta, R. Abbott, A. Viros, R.K.W. Wong, B.J. Dunbar, **D. Selva** and A. Diaz-Artilles. Effects on Human Performance of using a Virtual Assistant for Spacecraft Anomaly Resolution. *AIAA Journal of Aerospace Information Systems*. Under review (first submitted March 1, 2024).
1. P. Dutta, P. K. Josan, R.K.W. Wong, B.J. Dunbar, A. Diaz-Artilles, and **D. Selva**. Effects of Explanations and Accuracy on Human Performance and Trust in AI-Assisted Anomaly Diagnosis Tasks. *Journal of Cognitive Engineering and Decision Making*. Under review (first submitted February 12, 2024).

#### EDITORIALS

2. J.T. Allison, M.A. Cardin, C. McComb, M.Y. Ren, **D. Selva**, C. Tucker, P. Witherell, Y. F. Zhao. Artificial Intelligence and Engineering Design. *ASME Journal of Mechanical Design*, Vol 144(2). 2022.
1. A. Golkar, **D. Selva**, and O. De Weck. Introduction to the Special Issue on Federated and Fractionated Satellite Systems. *Journal of Aerospace Information Systems* 14.8 pp. 411-411. 2017.

#### PEER-REVIEWED CONFERENCE PAPERS

78. B. Gorr, A. Aguilar, Z. Wu, W. Cho, K. Cheng, M. Stroud, V. Ravindra, C. David, H. Gao, Y. Sun, A. Mehta, G. Allen, **D. Selva**. Reactive Planning Strategy for Event-Driven Observation in Heterogeneous Sensor Webs. In 2024 IEEE International Geoscience And Remote Sensing Symposium (IGARSS).
77. C. Erwin, B. Gorr, and D. Selva. Task Planning Strategies for a Remote Sensing Water Quality Mission. In 2024 AIAA SciTech Forum.
76. H. Song, A. Viros-i-Martin, and **D. Selva**. Effect of Reflection and Incubation on Artificial-Intelligence-Assisted Design Space Exploration. In ASME 2023 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2023).
75. H. Song, A. Viros-i-Martin, and **D. Selva**. Understanding the Relation Between Designer Search Strategies and Designer Learning During Design Space Exploration. In ASME 2023 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2023).
74. B. Gorr, A. Aguilar, Z. Wu, W. Cho, K. Cheng, M. Stroud, V. Ravindra, C. David, H. Gao, Y. Sun, A. Mehta, G. Allen, **D. Selva**. Multi-Instrument Flood Monitoring With A Distributed, Decentralized, Dynamic And Context-Aware Satellite Sensor Web. In 2023 IEEE International Geoscience And Remote Sensing Symposium (IGARSS).
73. A. Aguilar, B. Gorr, **D. Selva**, Z. Wu, W. Cho, K. Cheng, A. Mehta, M. Stroud, G. Allen, V. Ravindra, C. David, H. Gao, Y. Sun. Decentralized Market-Based Observation Assignment Strategy for Dynamic Networks in Sensor Web Mission Concepts. In 2023 IEEE International Geoscience And Remote Sensing Symposium (IGARSS).
72. P. Dutta, P.K Josan, R.K.W. Wong, B.J. Dunbar, A. Diaz-Artilles, **Selva, D.** Effect of Explanations in AI-Assisted Anomaly Treatment for Human Spaceflight Mission. In Proceedings of the Human Factors and Ergonomics Society Annual Meeting. (Vol. 66, No. 1, pp. 697-701). Sage CA: Los Angeles, CA: SAGE Publications. 2022.

71. A. Kannan, G. Tsagkatakis, R. Akbar, **D. Selva**, V. Ravindra, R. Levinson, S. Nag, M. Moghaddam. Forecasting Soil Moisture Using A Deep Learning Model Integrated With Passive Microwave Retrieval. In 2022 IEEE International Geoscience And Remote Sensing Symposium (IGARSS).
70. A. Viros-i-Martin, and **D. Selva**. Improving Designer Learning in Design Space Exploration by Adapting to the Designer's Learning Goals. In ASME 2022 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2022).
69. H. Song, **D. Selva**, and D. McAdams. Patent Mining to Understand Functional Evolution of Engineering Systems. In ASME 2022 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2022).
68. A. M. Chaudhari and **D. Selva**. Evaluating Designer Learning and Performance in Interactive Deep Generative Design. In ASME 2022 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2022).
67. **D. Selva**, G.H. Allen, H. Gao, B. Gorr, A. Aguilar Jaramillo, A. Viros-i-Martin, Y. Sun, A. Mehta, S. Nag, V. Ravindra, C. David. 3D-CHESS: Decentralized, Distributed, Dynamic, and Context-Aware Heterogeneous Sensor Systems. In 2022 AAAI Spring Symposium.
66. F. Pereira, and **D. Selva**. Analysis of Navigation Performance with Lunar GNSS Evolution. In Proceedings of the 2022 International Technical Meeting of The Institute of Navigation (pp. 514-529). 2022.
65. A.-R. Short, P. Dutta, B. Gorr, L. Bedrosian, and **D. Selva**. Representing and Analyzing Sequential Satellite Mission Design Decisions through Anisomorphic Trees and Directed Graphs. 2022 AIAA SciTech Forum. DOI: 10.2514/6.2022-0925.
64. B. Simpson, **D. Selva**, and D. Richardson. Extracting Science Traceability Graphs from Mission Concept Documentation using Natural Language Processing. 2022 AIAA SciTech Forum. DOI: 10.2514/6.2022-1182.
63. A. Viros Martin, **D. Selva**. A Framework to Study Human-AI Collaborative Design Space Exploration. In Proc. ASME. IDETC-CIE2021, Volume 6: 33rd International Conference on Design Theory and Methodology (DTM), V006T06A052, August 1719, 2021. DOI: 10.1115/DETC2021-67619
62. R. Suresh Kumar, S. Srivatsa, M. Silberstein, and **D. Selva**, Leveraging Design Heuristics for Multi-Objective Metamaterial Design Optimization. In Proc. ASME. IDETC-CIE2021, Volume 3B: 47th Design Automation Conference (DAC), V03BT03A032, August 1719, 2021. DOI: 10.1115/DETC2021-71226
61. A. Chaudhari and **D. Selva**, Supporting Designer Learning and Performance in Design Space Exploration: A Goal-Setting Approach. In Proc. ASME. IDETC-CIE2021, Volume 6: 33rd International Conference on Design Theory and Methodology (DTM), V006T06A058, August 1719, 2021. DOI: 10.1115/DETC2021-71257
60. B. Gorr, A. Aguilar, **D. Selva**, V. Ravindra, M. Moghaddam, S. Nag. Heterogeneous Constellation Design for A Smart Soil Moisture Radar Mission. In IGARSS 2021. In 2021 IEEE International Geoscience and Remote Sensing Symposium. DOI: 10.1109/IGARSS47720.2021.9553234

59. S. Nag, M. Moghaddam, **D. Selva**, J. Frank, V. Ravindra, R. Levinson, A. Azemati, B. Gorr, A. Li, R. Akbar. Soil Moisture Monitoring Using Autonomous and Distributed Spacecraft (D-SHIELD). In 2021 IEEE International Geoscience and Remote Sensing Symposium. DOI: 10.1109/IGARSS47720.2021.9554823
58. R. Woodruff, N. Beebe, P.K. Josan, R.K.W. Wong, B.J. Dunbar, **D. Selva**, and A. Diaz-Artiles. 2021. 3D Interactive Model of HERA to Support ECLSS Anomaly Resolution Using a Virtual Assistant. In 2021 IEEE Aerospace Conference. DOI: 10.1109/AERO50100.2021.9438341
57. P. K. Josan, N. Beebe, L. Kluis, K. York, A. Viros, R. Woodruff, B.J. Dunbar, R.K.W. Wong, **D. Selva** and A. Diaz-Artiles. 2021. Experimental Design & Pilot Testing for ECLSS Anomaly Resolution Using Daphne-AT Virtual Assistant. In 2021 IEEE Aerospace Conference. DOI: 10.1109/AERO50100.2021.9438497
56. B. Gorr and **D. Selva**, “Assessing the value of on-board image processing in observation task planning: the cloud mask problem”. In 2021 AIAA SciTech Forum. DOI: 10.2514/6.2021-1468
55. A. Viros Martin, K. Cheng, A. Fang, Z. Zheng, H. Kress-Gazit, A. Mehta, **D. Selva**, Y. Sun. “Decentralized Context-Based On-Board Planning for Earth Observation Missions”. In 2021 AIAA SciTech Forum. DOI: 10.2514/6.2021-1469
54. P. Garcia-Buzzi, **D. Selva** and M. Sanchez-Net. Exploring Reinforcement Learning for Autonomous Delay Tolerant Network Management. In 2020 AIAA ASCEND. DOI: 10.2514/6.2020-4007
53. S. Nag, M. Moghaddam, **D. Selva** and J. Frank. D-SHIELD: Distributed Spacecraft With Heuristic Intelligence to Enable Logistical Decisions. In 2020 IEEE International Geoscience and Remote Sensing Symposium (IGARSS’20). DOI: 10.1109/IGARSS39084.2020.9323248
52. A. Viros i Martin, **D. Selva** and R. Alimo. Scheduling Mission Reconfiguration for an Interferometry Synthetic Aperture Radar using Deep Reinforcement Learning. In 2020 IEEE International Geoscience and Remote Sensing Symposium (IGARSS’20). DOI: 10.1109/IGARSS39084.2020.9324371
51. F. Pereira and **D. Selva**. Exploring the Design Space of Lunar GNSS in Frozen Orbit Conditions. In 2020 IEEE/ION Position, Location and Navigation Symposium (PLANS). DOI: 10.1109/PLANS46316.2020.9110202
50. A. Viros Martin and **D. Selva**, Learning comes from Experience: The Effects on Human Learning and Performance of a Virtual Assistant for Design Space Exploration. In: Gero J.S. (eds) Design Computing and Cognition20. Springer, Cham. DOI: 10.1007/978-3-030-90625-2\_39
49. H. Bang and **D. Selva**, Measuring human learning in design space exploration to assess effectiveness of knowledge discovery tools. In Proceedings of the ASME 2020 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2020), V008T08A017, 2020. DOI: 10.1115/DETC2020-22633
48. P. G. Buzzi and **D. Selva**, Evolutionary formulations for design of heterogeneous Earth observing constellations. In 2020 IEEE Aerospace Conference, 2020. DOI: 10.1109/AERO47225.2020.9172715
47. S. Santini De Leon, **D. Selva**, and D. W. Way, Interactive Explanation of Entry, Descent, and Landing Simulations. In AIAA SciTech Forum 2020, 2020. DOI: 10.2514/6.2020-2094

46. P. Dutta, O. Balcells-Quintana, A. Viros-i-Martin, R.S. Whittle, P.K. Josan, N. Beebe, B.J. Dunbar, R.K.W. Wong, A. Diaz-Artiles, and **D. Selva**. Virtual Assistant for Anomaly Treatment in Long Duration Exploration Missions. In 2020 AIAA SciTech Forum, 2020. DOI: 10.2514/6.2020-2255
45. A. Viros-i-Martin and **D. Selva**. Explanation Approaches for the Daphne Virtual Assistant. In AIAA SciTech Forum 2020, 2020. DOI: 10.2514/6.2020-2254
44. S. Santini De Leon, **D. Selva**, and D.W. Way. A Cognitive Assistant for Entry, Descent, and Landing Architecture Analysis. In 2019 IEEE Aerospace Conference. DOI: 10.1109/AERO.2019.8742177
43. Pereira, F. and **Selva, D.** Exploring the Architecture Trade Space of NextGen Global Navigation Satellite Systems. In 2019 IEEE Aerospace Conference. DOI: 10.1109/AERO.2019.8741849
42. A. Viros-i-Martin, and **D. Selva**. From Design Assistants to Design Peers: Turning Daphne into an AI Companion for Mission Designer. AIAA Scitech 2019 Forum, AIAA SciTech Forum, AIAA 2019-0402. DOI: 10.2514/6.2019-0402
41. **D. Selva**, and P. Dutta. (2018). Is there a future to GEO-based weather monitoring? The coverage-cost argument. In 2018 IEEE International Geoscience and Remote Sensing Conference. DOI: 10.1109/IGARSS.2018.8517432
40. Bang, H., Viros Martin, A., Prat, A., Yoon, S-Y., Hoffman, G., and **Selva, D.** (2018). Exploring the Feature Space to Aid Learning in Design Space Exploration. In Gero J. (eds) Design Computing and Cognition '18. DCC 2018. Springer, Cham. DOI: 10.1007/978-3-030-05363-5\_11
39. Law, M., Dhawan, N., Bang, H., **Selva, D.**, Yoon, S-Y., and Hoffman, G. Side-by-side Human-Computer Design using a Tangible User Interface. In Gero J. (eds) Design Computing and Cognition '18. DCC 2018. Springer, Cham. DOI: 10.1007/978-3-030-05363-5\_9
38. Shi, L., Bang, H., **Selva, D.**, Hoffman, G., and Yoon, S-Y. (2018). Cognitive style and field knowledge in complex design problem solving: A comparative case study of decision support systems. In Gero J. (eds) Design Computing and Cognition '18. DCC 2018. Springer, Cham. DOI: 10.1007/978-3-030-05363-5\_19
37. Sease, M., Smith, B., **Selva, D.** and Hummell, J. Setting Priorities: Demonstrating Stakeholder Value Networks in SysML. 2018 INCOSE International Workshop. DOI: 10.1002/j.2334-5837.2018.00543.x
36. Santini De Leon, S., and **Selva, D.** A Rule-Based Tool for Science Traceability of Mars Exploration Mission Architectures. In 2018 IEEE Aerospace Conference. DOI: 10.1109/AERO.2018.8396804
35. Hitomi, N., and **Selva, D.** Constellation Optimization Using an Evolutionary Algorithm with a Variable-length Chromosome. In 2018 IEEE Aerospace Conference. DOI: 10.1109/AERO.2018.8396743
34. Bang, H., Viros Martin, A., Prat, A., and **Selva, D.** (2018). Daphne : An Intelligent Assistant for Architecting Earth Observing Satellite Systems. AIAA SciTech 2018, AIAA 2018-1366. DOI: 10.2514/6.2018-1366
33. Bang, H., and **Selva, D.**, Leveraging Logged Intermediate Design Attributes For Improved Knowledge Discovery In Engineering Design, Proceedings of the ASME 2017 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2017. DOI: 10.1115/DETC2017-67835. 2017.



32. Stojanovski, Z., Hall, U., and **Selva, D.** (2017). Optimizing Commonality and Performance in Platform-Based Earth Observing SmallSat Architectures. In *2017 IEEE Aerospace Conference*. DOI: 10.1109/AERO.2017.7943665. 2017.
31. N. Hitomi, H. Bang, and **D. Selva.** Extracting and Applying Knowledge with Adaptive Knowledge-driven Optimization to Architect and Earth Observing Satellite System. *AIAA Information Systems-AIAA Infotech @ Aerospace, AIAA SciTech Forum, (AIAA 2017-0794)*. 2017. DOI: 10.2514/6.2017-0794
30. N.Knerr, **D. Selva.** Mining Multi-Objective Minimal Commitment Decision Significance via Cluster-and-Find-Changes. *58th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*. 2017. DOI: 10.2514/1.C000311
29. H. Bang, **D. Selva.** iFEED: Interactive Feature Extraction for Engineering Design. *Proceedings of the ASME 2016 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2016*. 2016. DOI: 10.1115/DETC2016-60077
28. N. Hitomi, **D. Selva.** A hyper-heuristic approach to leveraging domain knowledge in multi-objective evolutionary algorithms. *Proceedings of the ASME 2016 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2016*. 2016. DOI: 10.1115/DETC2016-59870
27. R. Patel, W. Paleari and **D. Selva.** Architecture Study of an Energy Microgrid. *2016 11th System of Systems Engineering Conference (SoSE)*, Kongsberg. 2016. DOI: 10.1109/SYSOSE.2016.7542932
26. **Selva, D.**, Dingwall, B. and Altunc, S. A Concept for an Agile Mission Development Facility for CubeSat and Suborbital Missions. In: *2016 IEEE Aerospace Conference*, Big Sky, MT, 2016. DOI: 10.1109/AERO.2016.7500564
25. S. J. Das, **D. Selva**, and A. Golkar. "An Intelligent Spacecraft Configuration Tool for Mission Architecture Space Exploration", AIAA SPACE 2015 Conference and Exposition, AIAA SPACE Forum, (AIAA 2015-4439). DOI: 10.2514/6.2015-4439.
24. N. Hitomi, **D. Selva.** The Effect of Credit Definition and Aggregation Strategies on multi-objective hyper-heuristics. *Proceedings of the ASME 2015 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2015*. 2015. DOI: 10.1115/DETC2015-47445
23. N. Hitomi, **D. Selva.** Experiments with Human Integration in Asynchronous and Sequential Multi-Agent Frameworks for Architecture Optimization. *Procedia Computer Science*, Vol. 44, pp. 393-402. 2015. DOI: 10.1016/j.procs.2015.03.024
22. C. Abello, N. Hitomi, **D. Selva.** Preliminary Experiments with Learning Agents in an Interactive Multi-agent Systems Architecture Tradespace Exploration Tool. *2015 Annual IEEE Systems Conference (SysCon) Proceedings*, Vancouver, BC, 2015 pp. 445-452. DOI: 10.1109/SYSCON.2015.7116791
21. M. Jacobs, **D. Selva.** A Cubesat Catalog Design Tool for a Multi-Agent Architecture Development Framework. In: *2015 IEEE Aerospace Conference*, Big Sky, MT, 2015. DOI: 10.1109/AERO.2015.7119240
20. I. Del Portillo, E. Bou, E. Alarcon, M. Sanchez-Net, **D. Selva**, A. Alvaro. On scalability of Fractionated Satellite Network architectures. *2015 IEEE Aerospace Conference*, Big Sky, MT, 2015. DOI: 10.1109/AERO.2015.7119143

19. **Selva, D.**, Development of a Test-Bed for Knowledge-Intensive System Architecture Optimization, *2014 IEEE International Conference on Systems, Man, and Cybernetics (SMC)*, San Diego, CA, 2014, pp. 3394-3398. DOI: 10.1109/SMC.2014.6974452
18. **Selva, D.**, Knowledge-intensive Global Optimization of Earth observing System Architectures: A Climate-centric Case Study, *Proc. SPIE. 9241, Sensors, Systems, and Next-Generation Satellites XVIII, 92411S*. 2014. DOI: 10.1117/12.2067558
17. Helmuth, D., **Selva, D.**, and Dwyer, M., Collaboration pathways using new tools for optimizing operational climate monitoring from space: A Climate-centric Case Study, *Proc. SPIE. 9241, Sensors, Systems, and Next-Generation Satellites XVIII, 92411R*. 2014. DOI: 10.1117/12.2067427
16. Dwyer, M. Szajnfarber, Z., **Selva, D.**, Crawley, E., 2014. The Cost of Jointness and How to Manage It. *AIAA SPACE 2014 Conference and Exposition, AIAA SPACE Forum, (AIAA 2014-4443)*. 2014. DOI: 10.2514/6.2014-4443
15. Dwyer, **Selva, D.**, M. Szajnfarber, Z., Cameron, B., Crawley, E., 2014. Exploring the Trade-offs of Aggregated versus Disaggregated Architectures for Environmental Monitoring in Low-Earth Orbit. *AIAA SPACE 2014 Conference and Exposition, AIAA SPACE Forum, (AIAA 2014-4416)*. 2014. DOI: 10.2514/6.2014-4416
14. M. Sanchez, **D. Selva**, B. Cameron, A. Seas, B. Seery and E.F. Crawley. Results of the MIT Space Communication and Navigation Architecture Study. *2014 IEEE Aerospace Conference*, Big Sky, MT, 2014. DOI: 10.1109/AERO.2014.6836339
13. **D. Selva** Experiments in knowledge-intensive system architecting: Interactive architecture optimization. *2014 IEEE Aerospace Conference*, Big sky, MT, 2014. DOI: 10.1109/AERO.2014.6836282
12. M. Sanchez, **D. Selva**, A. Golkar. Exploring Classification Algorithms for Early Mission Formulation Cost Estimation. *2014 IEEE Aerospace Conference*, Big Sky, MT, 2014. DOI: 10.1109/AERO.2014.6836326
11. **D. Selva** and E.F. Crawley. VASSAR: Value Assessment of System Architectures Using Rules. *2013 IEEE Aerospace Conference*, Big Sky, MT, 2013. DOI: 10.1109/AERO.2013.6496936
10. M. Sanchez, **D. Selva**, B. Cameron, A. Seas, B. Seery and E.F. Crawley. Exploring the Architectural Trade Space of NASA's Space Communication and Navigation Program. *2013 IEEE Aerospace Conference*, Big Sky, MT, 2013. DOI: 10.1109/AERO.2013.6497173
9. M. Dwyer, **D. Selva**, Z. Szajnfarber, B. Cameron, and E. F. Crawley. The impact of technical complexity on the decision to collaborate and combine. *2013 IEEE Aerospace Conference*, Big Sky, MT, 2013. DOI: 10.1109/AERO.2013.6496898
8. L. Dyrud, J. Fentzke, G. Bust, B. Erlandson, S. Whitely, B. Bauer, S. Arnold, **D. Selva**, K. Cahoy, S. Slagowski, W. Wiscombe, S. Lorentz, R. Bishop, B. Gunter, K. Trenberth. GEOScan: A Global, Real-Time Geoscience Facility. *2013 IEEE Aerospace Conference*, Big Sky, MT, 2013. DOI: 10.1109/AERO.2013.6497141
7. **Selva, D.**, and Krejci, D., Preliminary Assessment of Performance and Cost of a Cubesat Component of the Earth Science Decadal Survey. *27th Annual AIAA-USU Conference on Small Satellites*, August 2013.

6. **D. Selva** and E.F. Crawley. A rule-based decision support tool for architecting Earth observing missions. *2012 IEEE Aerospace Conference*, Big Sky, MT, 2012. DOI: 10.1109/AERO.2012.6187439
5. **D. Selva** and E.F. Crawley. Exploring Packaging Architectures for the Earth Science Decadal Survey. *2011 IEEE Aerospace Conference*, Big Sky, MT, 2011. DOI: 10.1109/AERO.2011.5747651
4. **D. Selva** and E.F. Crawley. Integrated Assessment of Packaging Architectures in Earth Observing Programs. *2010 IEEE Aerospace Conference*, Big Sky, MT, 2010. DOI: 10.1109/AERO.2010.5446885
3. P. M. Cunio, A. Babuscia, Z. J. Bailey, H. Chaurasia, R. Goel, A. Golkar, **D. Selva**, E. Timmons, B. E. Cohanin, J. A. Hoffman, and D. W. Miller. Initial Development of an Earth-Based Prototype for a Lunar Hopper Autonomous Exploration System. *AIAA SPACE 2009 Conference & Exposition, AIAA SPACE Forum*. 2009. DOI: 10.2514/6.2009-6713
2. J. Krueger, **D. Selva**, M. Smith and J. Keesee. Constellation and Spacecraft Design for a Continuous Responsive Imaging System in Space. *AIAA SPACE 2009 Conference & Exposition, AIAA SPACE Forum*. 2009. DOI: 10.2514/6.2009-6773
1. **Selva Valero, D.**, Near-Far Field Corrections in the Measurement of an Interferometric Two-Dimensional Radiometer in Anechoic Chambers. *IAF abstracts, 34th COSPAR Scientific Assembly, The Second World Space Congress*, 10–19 October, 2002.

CONFERENCE  
ABSTRACTS AND  
POSTERS

21. B. Gorr, A. Aguilar, **D. Selva**, H. Gao, M. Stroud, G. Allen. Utility of remote sensing observations of short timescale events in rivers and lakes. In Fall Meeting 2023. AGU.
20. **Selva, D.**, Allen, G. H., Gao, H., Gorr, B. J., Aguilar, A., Viros-i-Martin, A., Sun, Y., Mehta, A., Ravindra, V., David, C., & Stroud, M. (2022, December). Simulating A Context-aware Heterogeneous Sensor System for Monitoring Inland Waters and Ecosystems with 3D-CHESS. In Fall Meeting 2022. AGU.
19. Stroud, M., Allen, G. H., Simard, M., Jensen, D., **Selva, D.**, Gao, H., & David, C. H. (2022, December). Assessing Altimetry and Optical Remote Sensing Products to Study Global Sediment Transport Dynamics in Earths Inland Water Bodies. In Fall Meeting 2022. AGU.
18. Allen, G. H., **Selva, D.**, Gorr, B. J., Gao, H., Ellis, E. A., Stroud, M., Li, Y., Morgan, John C., Riggs, R., & Reed, H. (2022, December). Developing a SmallSat Mission Concept to Monitor Inland Water Quality. In Fall Meeting 2022. AGU.
17. P. K. Josan, P. Dutta, A. Diaz-Artilles, **D. Selva**. (2022). Daphne-AT: A Crew Assistance Tool for Anomaly Treatment during Long Duration Exploration Missions. 2022 Applied Human Factors and Ergonomics (AHFE) Conference.
16. **Selva, D.**, Josan, P. K., Dutta, P., Abbott, R., Viros-i-Martin, A., York, K., Dunbar, B. J., Wong, R. K. W., Diaz-Artilles, A. (2022). Virtual Assistant For Anomaly Resolution In Long Duration Exploration Missions: Baseline Effects On Performance, Cognitive Workload, And Situational Awareness. 2022 Human Research Program Investigators Workshop. (Virtual)

15. Dutta, P., Josan, P.K., Viros, A., York, K., Abbott, R., Dunbar, B.J., Wong, R.K.W., Diaz-Artiles, A., **Selva, D.** (2022). Virtual Assistants For Anomaly Treatment Lessons Learned And Path Forward. 2022 Human Research Program Investigators Workshop. (Virtual)
14. Josan, P.K., Dutta, P., Abbott, R., Viros, A., York, K., Dunbar, B.J., Wong, R.K.W., **Selva, D.**, Diaz-Artiles, A. (2022). Results from First Laboratory Testing of Virtual Assistant Daphne-AT. 2022 Human Research Program Investigators Workshop. (Virtual)
13. B. Gorr, **D. Selva**, G. H. Allen, H. Gao, Y. Li, H. Reed. Onboard Data Processing and Planning for Inland Water Quality Satellites. AGU Fall Meeting 2021.
12. B. Simpson, **D. Selva**, D. Richardson. Using Natural Language Processing to Extract Science Traceability from Astrophysics-based Mission Concept Documentation. AGU Fall Meeting 2021.
11. **D. Selva**, A. Viros-i-Martin. A knowledge graph and question answering system for reasoning about space-based Earth Observation capabilities. AGU Fall Meeting 2021.
10. **D. Selva**, P. Dutta, P.K. Josan, K. York, R. Woodruff, A. Viros-i-Martin, N. Beebe, A.-R. Short, R.K.W. Wang, B.J. Dunbar, and A. Diaz-Artiles (2021). Virtual assistant for anomaly resolution in long duration exploration missions: first results and preparations for HERA campaign. 2021 Human Research Program Investigators Workshop.
9. Josan P., Dutta P., Viros A., Beebe N., Balcells O., McCarthy M., Whittle R.S., Dunbar B.J., **Selva D.**, Wong R.K.W., and Diaz Artiles A. Front-end Development and Experimental Design for a Virtual Assistant in Long Duration Exploration Missions (abstract and poster). NASA Human Research Program Investigators Workshop, Galveston, TX, 27-30 Jan, 2020.
8. **D. Selva**, A. Diaz-Artiles, B.J. Dunbar, R.K.W. Wong, P. Dutta, A. Viros Martin, N. Beebe, O. Balcells Quintana, M. McCarthy, P.K. Josan, R.S. Whittle. Virtual Assistant for Anomaly Treatment During Long Duration Exploration Missions. NASA Human Research Program Investigators Workshop, Galveston, TX, 27-30 Jan, 2020.
7. N. Knerr, N. Kinzly, and D. Selva. "Cityplot-VR: Implementing virtual reality for design decision tradeoff visualization". *IDETC 2017*, 2017. Poster.
6. N. Knerr and **D. Selva**. Cityplot: Multi-objective Tradeoff Visualization Respecting Decisions Similarity. *CESUN Meeting 2016*, 2016. Poster.
5. H. Bang and **D. Selva**. Designing visual and verbal interactions for improved understanding and validation of rule-based value functions in system architecture. *CESUN Meeting 2016*, 2016. Poster.
4. N. Hitomi, **D. Selva**. Adaptive Domain-Specific Heuristics for Optimization of Systems Architecture. *CESUN Meeting 2016*, 2016. Poster.
3. N. Hitomi, **D. Selva**. A Knowledge-Based Decision-Support Tool for Architecting Severe Weather Monitoring Nanosatellite Constellations *AGU Fall Meeting 2014*, December 2014. Poster.
2. W. Blackwell, C. Crail, C. Galbraith, R. Leslie, I. Osaretin, M. Shields, A. Marian, A. Nicholas, K. Cahoy, and **D. Selva**. Nanosatellite Architectures for Improved Study of the Hydrologic Cycle. *AGU Fall Meeting 2012*, December 2012. Poster.

1. C. Calvo-Juan, T. Seher, **D. Selva**, B. Suarez, T. Sutherland, and E. F. Crawley. Computational Tools for Architecting the nation's space-based Earth Observation Program. *2nd International Conference on Computational Sustainability*, June 28–30 2010. Poster.

THESIS AND  
DISSERTATION

2. **D. Selva**, *Rule-based System Architecting of Earth Observing Satellite Systems*. Dissertation, Massachusetts Institute of Technology, Cambridge, MA, 2012.
1. **D. Selva**, *Modélisation des pertes de profil d'aubage dans l'outil de mise en place de veine compresseur*. Master's thesis, Ecole Nationale Supérieure de l'Aéronautique et de l'Espace, Toulouse, France, 2004.

INVITED TALKS,  
PANELS AND  
SEMINARS

39. Invited panelist at 2024 AIAA Scitech Forum. Designing with Intelligence. Exploring the promise and challenges of IA In Aerospace. January 10, 2024.
38. Invited seminar at **Penn State University**, September 7, 2023.
37. Invited panelist at the Human Factors and Ergonomics Society - Houston Symposium. April 21, 2023
36. Invited seminar at **NASA Langley Research Center**, January 19, 2023.
35. Invited talk at the Aerospace Control and Guidance Systems Committee Meeting, October 27, 2022.
34. Invited seminar at **Rensselaer Polytechnic Institute**, October 12, 2022.
33. Invited talk at the **INCOSE AI Explorer Event**, September 14, 2022.
32. Panelist at the **ASME Design Automation Conference** workshop “Trends in Human-AI Teaming for Engineering and Design”, August 14, 2022.
31. Invited seminar at **AIAA Intelligent Systems Seminar Series**, April 19, 2022.
30. Invited seminar at **Grado Department of Industrial and Systems Engineering, Virginia Tech**, February 15, 2022.
29. Panelist for the “Signature event” of the 2021 **ASME Design Automation Conference** on “The Future of Human-AI Collaboration for Engineering Design”, August 18, 2021.
28. Invited seminar at **Jet Propulsion Lab**, May 26, 2021.
27. Panelist at the Fractionated and Federated Satellite Systems Workshop, May 31, 2021
26. Invited lecture at Aggie Astronaut Corps Workshop, April 23, 2021
25. Invited seminar at **MIT**, March 22, 2021.
24. Invited seminar at **George Washington University**, March 5, 2021.
23. Guest Lecture at MIT Online Course on Model-Based Systems Engineering, June 2020.
22. at Texas A&M University AESS Seminar Series, February 13, 2020.

21. Invited seminar at **NASA Langley Research Center**, October 18, 2019.
20. Invited seminar at **Jet Propulsion Lab**, February 9, 2018.
19. Invited seminar at **MITRE**, December 6, 2017.
18. Invited seminar at **Texas A&M University**, August 17, 2017.
17. Invited seminar at **Oregon State University**, March 3, 2017.
16. Invited seminar at **University of Connecticut** UTC Institute for Advanced Systems Engineering, February 17, 2017.
15. Panelist at **4th FSS Workshop**, Rome, Oct 10, 2016.
14. Invited seminar at **The Aerospace Corporation**, May 17, 2016.
13. Invited seminar at **Syracuse University**, April 29, 2016.
12. Invited seminar at **University of Alabama in Huntsville**, April 13, 2016.
11. Invited seminar at **Boeing Helicopters**, February 22, 2016.
10. Panelist at the **INCOSE Finger Lakes Chapter Annual Dinner**, April 27, 2015.
9. Guest lecturer at **Institut Supérieur de l'Aeronautique et de l'Espace**, April 27, 2015.
8. Invited seminar at **Lockheed Martin**, July 17, 2014.
7. Invited seminar at **Cornell University** - Mechanical&Aerospace Engineering School, March 13, 2013.
6. Invited seminar at **European Space Agency** - Advanced Concepts Team, February 22, 2013.
5. Invited seminar at **NASA Jet Propulsion Laboratory**, December 11, 2012.
4. Invited seminar at **George Washington University**, November 1, 2012.
3. Invited seminar at **Applied Physics Laboratory**, John Hopkins University, March 1, 2012.
2. Invited talk at **NASA Langley Research Center**, October 5, 2010.
1. Invited talk at **Future In-Space Operations Working Group**, December 16, 2009.

TEACHING  
EXPERIENCE

**Texas A&M University**, College Station, TX

- **AERO 489/689: Autonomous Aerospace Systems** (Spring 2024, Spring 2025)
  - Co-created this course from scratch.
  - This course introduces students to topics related to the design, implementation and verification of robust aerospace autonomous systems that incorporate expert knowledge and learn from interacting with their environment. Topics covered include knowledge representation and reasoning, sequential decision-making models, learning from examples, Reinforcement Learning. Example applications include Earth observation satellites, planetary rovers, and UAV swarms.

- AERO 489/689: Foundations of Aerospace Autonomy (Fall 2023, Fall 2024)
  - Created this course from scratch.
  - This course introduces students to the mathematical and computational foundations of aerospace systems autonomy. The necessary basic concepts to undertake the study of aerospace autonomous and intelligent systems (data structures, algorithms, probability theory, and optimization) are covered. Classical artificial intelligence topics are covered including search, constraint satisfaction, and logical and probabilistic reasoning. Example applications are planetary rovers and UAV swarms.
- AERO 424: Spacecraft Attitude Dynamics and Controls (Fall 21)
  - Introduces fundamental concepts of satellite attitude dynamics and control; includes derivations of environmental disturbances due to gravity gradient, aerodynamic, and solar radiation pressure; includes treatments of attitude control subsystems, such as thrusters, reaction wheels, CMGs, and magnetic torquers, and their designs.
- AERO 401: Aerospace Design Principles (Fall 18, Fall 19, Fall 20, Fall 22).
  - Redesigned this course from scratch, modernizing the curriculum.
  - Introduction to systems engineering and design. Lifecycle, requirements, conops, system architecture, trade studies, cost and risk assessment, ethics, technical communication. Application to an aerospace system.
- AERO 402: Aerospace System Design (Spring 19, Spring 20, Spring 21, Spring 22, Fall 22).
  - Continuation of AERO 401; detailed design; subsystem integration; realization of the system through prototyping, modeling, and/or simulation; verification and validation through experimentation and analysis; documentation and presentation of results.
- AERO 689: Foundations of systems engineering (Spring 21).
  - Created this course from scratch.
  - Overview of the mathematical foundations of systems engineering, including graph theory, set theory, probability theory, and optimization and their applications in modeling and decision making in the systems engineering process.

#### **Cornell University, Ithaca, NY**

- MAE 4160: Spacecraft Technology and Systems Architecture (Spring 2016, Spring 2018).
  - Broad survey of the spacecraft mission design process including payload and subsystem technologies.
- SYSEN 5400: Systems Architecture (Fall 2015, Spring 2015, Fall 2016).
  - Stakeholder analysis, architecture description languages and frameworks, architecture enumeration, evaluation, tradespace analysis, flexibility, resilience, commonality, legacy systems.
- SYSEN 6000: Foundations of Complex Systems (Spring 2017, Fall 2017).
  - Required for all new PhD students in Systems. Survey course co-taught by different instructors covering the basic theoretical foundations of systems science and engineering, including graph and network theory, non-linear dynamics and chaos, automata, pattern recognition, optimization, decision making under uncertainty, and game theory.

- SYSEN 8000: Systems Doctoral Colloquium (Fall 2017).
  - Required for all PhD students in Systems. Students are exposed to different research methodologies (qualitative and quantitative) and engage in critical reviews and discussion of selected research articles in the fields of systems science and engineering.

*PhD Students graduated*

10. **Gabriel Apaza (2024)**. PhD candidate at Texas A&M University Aerospace Engineering (2019-2024). Now at: **University of Maryland**. Thesis title: Generative AI in Design Space Exploration.
9. **Benjamin Gorr (2024)**. PhD candidate at Texas A&M University Aerospace Engineering (2020-2024). Now at: **SpaceX**. Thesis title: Science-Driven Constellation Design and Operations for Earth Observation.
8. **Prachi Dutta (2024)**. PhD candidate at Texas A&M University Aerospace Engineering (2018-2024). Now at: **University of Colorado at Boulder**. Thesis title: Human-AI Collaborative Anomaly Resolution in Long-Duration Exploration Missions.
7. **Felipe Pereira (2022)**. PhD in Systems at Cornell University (2017-2022). Now at **Added Value Solutions**. Thesis title: Next generation architectures for global navigation satellite systems.
6. **Antoni Viros i Martin (2022)**. PhD in Aerospace Engineering from Texas A&M University (2018-2022). Now at IBM Research. Thesis title: Cognitive assistants for early space mission formulation
5. **Samalis Santini De Leon (2021)**. PhD in Aerospace Engineering from Texas A&M University (2016-2021). Now at **Johns Hopkins Applied Physics Lab**. Thesis title: Intelligent Data Understanding for Architecture Analysis of Entry, Descent, and Landing Systems
4. **Pau Garcia Buzzi (2021)**. PhD in Aerospace Engineering from Texas A&M University (2016-2021). Now at **RKF Engineering/Kythera Space Solutions**. Thesis title: Artificial Intelligence tools for the design and operation of Earth observing constellations.
3. **Nathan Knerr (2020)**. PhD in Mechanical Engineering from Cornell University MAE (2013-2020). Now at **University of Alabama**. Thesis title: Lost in (Design) Space: Visual and data analytics for engineering design of complex systems.
2. **Harris Bang (2019)**. PhD in Mechanical Engineering from Cornell University MAE (2014-2019). Now at **Johns Hopkins Applied Physics Lab**. Thesis title: Interactive Knowledge Extraction and Learning for Architecting Complex Systems.
1. **Nozomi Hitomi (2018)**. PhD in Mechanical Engineering from Cornell University (2013-2018). Now at **The Aerospace Corporation**. Thesis title: Multiobjective Optimization for Space Systems Architecture: Applying and Extracting Knowledge

*PhD Students in progress*

5. **Alan Aguilar Jaramillo**. PhD candidate at Texas A&M University Aerospace Engineering (2020-present). PhD topic: Decentralized Planning Algorithms for Distributed Earth Observation Missions.



4. **Roshan Suresh Kumar**. PhD candidate at Texas A&M University Aerospace Engineering (2019-present). PhD topic: Knowledge and Data-Driven Design of Mechanical Meta-materials
3. **Alex Demagall**. PhD candidate at Texas A&M University Aerospace Engineering (2023-present). PhD topic: Generative design of spacecraft configurations.
2. **Priyank Dubey**. PhD candidate at Texas A&M University Aerospace Engineering (2024-present). PhD topic: Applications of hybrid artificial intelligence and quantum optimization algorithms to space system design and operations.
1. **Kazuki Toma**. PhD candidate at Texas A&M University Aerospace Engineering (2024-present). PhD topic: Anomaly Diagnosis system with Physics-based Simulation for Long-Duration Exploration Missions.

*M.Sc. Students graduated*

2. **Chrissi Erwin (2024)**. MS Student at Texas A&M University Aerospace Engineering (2022-present). Thesis topic: Planning algorithms for new Earth Observing mission concepts.
1. **Benjamin Simpson (2022)**. MS in Aerospace Engineering at Texas A&M University (2020-2022). Now at **The Aerospace Corporation**. Thesis title: Automatic Ontology Generation for Early Mission Formulation Activities.

*M.Sc. Students in progress*

4. **Jose Mata Goptar**. M.Sc. candidate at Texas A&M University Aerospace Engineering (2024-present). M.Sc. topic: Representation learning for autonomous decision making in Earth observing sensor webs.
3. **David Fornos**. M.Sc. candidate at Texas A&M University Aerospace Engineering (2024-present). M.Sc. topic: Generative design of spacecraft configurations.
2. **Shirish Pandam**. M.Sc. candidate at Texas A&M University Aerospace Engineering (2024-present). M.Sc. topic: Tradespace Exploration for space-based gravity missions.
1. **Joshua Elston**. M.Sc. candidate at Texas A&M University Aerospace Engineering (2024-present). M.Sc. topic: A Bayesian framework for human-AI collaborative anomaly diagnosis.

*Post-doctoral researchers*

3. **Hyeonik Song**. August 2021–August 2023. PhD in Mechanical Engineering (Georgia Tech, 2021). Worked on several projects on human-AI collaborative design. Now **Instructional Assistant Professor at California Polytechnic State University**.
2. **Ashish Chaudhari**. August 2020–August 2021. PhD in Mechanical Engineering (Purdue University, 2020). Worked on several projects on human-AI collaborative design. Now **Research Scientist at Philips Research North America**.
1. **Ada-Rhodes Short**. July 2020–July 2021. PhD in Mechanical Engineering (Oregon State University, 2018). Worked on several projects on human-AI collaborative design. Now **Assistant Professor at University of Nebraska Omaha**.

### *MEng Students*

- **Guanqiao Qian.** MEng, Mechanical Engineering, Cornell University (2017). MEng project: Natural Language Processing for Cognitive Design Assistant.
- **Allegra Moran.** MEng, Aerospace Engineering, Cornell University (2017). MEng project: Visualization tools and instructional materials for spaceflight mechanics.
- **Greg Cristina, Matt Eisner, Eric Grohn, Sushruth Kamath, Niccolo Porcari, Albert Quizon, Ellen Thiel, Cory Thomas.** MEng, Mechanical Engineering/Aerospace Engineering/Engineering Mechanics, Cornell University (2017). MEng project: CUGravity: Design of a CubeSat to demonstrate artificial gravity.
- **Anjit Fageria.** Meng candidate at Cornell University Systems Engineering (2015-2016). Meng project: Spacecraft configuration automation for concurrent architecture development software.
- **Alyssa Francken.** Meng candidate at Cornell University Systems Engineering (2015-2016). Meng project: Architecture study for a constellation of LEO satellites for global internet services.
- **Monica Jacobs.** Meng candidate at Cornell University Systems Engineering (2014-2015). Meng project: A Cubesat Catalog Design Tool for a Multi-Agent Architecture Development Framework.
- **Spandan Das.** Meng candidate at Cornell University MAE (2014-2015). Meng project: An automatic spacecraft configuration tool for rapid tradespace exploration.

### *Graduate Committee Membership*

- Member, MD Sunbeam, MS in Aerospace Engineering, Texas A&M University (2025)
- Member, Pradeep Bharathi, MS in Mechanical Engineering, Texas A&M University (2024)
- Member, Shantanu Vyas, PhD in Mechanical Engineering, Texas A&M University (2027)
- Member, Suryapavan Cheruku, MS in Mechanical Engineering, Texas A&M University (2023)
- Member, Grace McFassel, PhD in Computer Science, Texas A&M University (2023)
- Member, Poonampreet Kaur Josanam PhD in Aerospace Engineering, Texas A&M University (2024)
- Member, Chaitra Sharma, MS in Mechanical Engineering, Texas A&M University (2023)
- Member, Jiwon Bae, MS in Aerospace Engineering, Texas A&M University (2023)
- Member, Michael McCarthy, MS in Aerospace Engineering, Texas A&M University (2021)
- Member, Ritwik Bera, MS in Aerospace Engineering, Texas A&M University (2021)
- Member, Ting-Ju Chen, PhD in Mechanical Engineering, Texas A&M University (2021)
- Member, Vinicius Goecks, PhD in Aerospace Engineering, Texas A&M University (2020)
- Minor Member, Bernardo Carvalho, PhD in Civil and Environmental Engineering, Cornell University (2018)
- Minor Member, Kyle Doyle, PhD in Mechanical and Aerospace Engineering, Cornell University (2018)
- Minor Member, Gabriel Soto, PhD in Mechanical and Aerospace Engineering,

- Cornell University (2019)
- Minor Member, Zelin Linghu, MS in Mechanical and Aerospace Engineering, Cornell University (2018)
- Reader, Narek Shougarian (MIT)
- Reader, Ben Corbin (MIT)

*Undergraduate students (research supervisor)*

- **Kevin Zhang**. BS Aerospace Engineering, Texas A&M University. Research project: Using Natural Language Processing for Mission Concept Evaluation (Fall 2021–Spring 2022). Graduation: 05/2023.
- **Jonathan Lephuoc**. BS Aerospace Engineering, Texas A&M University. Research project: Spacecraft mission design tool (Fall 2021–Spring 2022). Graduation: 05/2023.
- **Ryunosuke Fujii**. BS Aerospace Engineering, Texas A&M University. Research project: Catalog-based design of Earth Observation missions (Fall 2021–Spring 2022). Graduation: 05/2022.
- **Collin Stafford**. BS Aerospace Engineering, Texas A&M University. Research project: Catalog-based design of Earth Observation missions (Fall 2021–Spring 2022). Graduation: 05/2024.
- **Payton Clem**. BS Aerospace Engineering, Texas A&M University. Research project: Simplifying SysML and Spacecraft Planning algorithm (Summer and Fall 2021). Graduation: 05/2023.
- **Luke Bedrosian**, BS Aerospace Engineering, Texas A&M University. Research project: Rule-based Design of Earth Observation Missions (Spring 2021–Present). Graduation: 05/2024.
- **Nikita Beebe**, BS Aerospace Engineering, Texas A&M University. Research project: Virtual Assistant for anomaly resolution in long duration exploration missions (Fall 2019 and Spring 2020). Graduated 05/2020.
- **Benjamin Gorr**, BS Aerospace Engineering, Texas A&M University. Research project: Daphne: A virtual assistant for early formulation of Earth observation missions (Spring 2020). Graduated 05/2020.
- **Renee Woodruff**, BS Aerospace Engineering, Texas A&M University. Research project: Virtual Assistant for anomaly resolution in long duration exploration missions (Fall 2019). Graduated 05/2020.
- **Kyle York**, BS Aerospace Engineering, Texas A&M University. Research project: Virtual Assistant for anomaly resolution in long duration exploration missions (Fall 2020–present). Graduation: 05/2023
- **Lalita Gadam**, BS Engineering Technology and Industrial Distribution. Research project: Daphne: A virtual assistant for early formulation of Earth observation missions (Fall 2020). Graduated 05/2021.
- **Amritansh Kwatra**. Undergraduate student at Cornell University (Summer 2017). **Engineering Learning Initiatives Undergraduate Research Award**.
- **Ria Singh**. Undergraduate student at Cornell University (Summer 2017).
- **Nathaniel Kinzly**. Undergraduate student at Cornell University (Spring 2017). Research project: Virtual reality environment for visualization of high-dimensional design spaces. Resulted in a poster presentation at IDETC.
- **Sooyoun Oh**. Undergraduate student at Cornell University (Summer 2016). Research project: Visual and data analytics for design of GN&C systems.
- **Kevin Liu**. Undergraduate student at Cornell University (Summer 2016). Research project: Improved astrodynamics model for concurrent architecture development software. Engineering Learning Initiatives Undergraduate Research Award.
- **Samuel Wu**. Undergraduate student at Cornell University (Summer 2016). Research project: Improved Structures model for concurrent architecture devel-

opment software.

- **Carmen Fang.** Undergraduate student at Cornell University (Summer 2016). Research project: Thermal model for concurrent architecture development software.
- **Nelson Ng.** Undergraduate student at Cornell University (Summer 2016). Research project: Improved ADCS model for concurrent architecture development software.
- **Zvonimir Stojanovski.** Undergraduate student at Cornell University (2015-present). Research project: Design tool for families of satellite missions with commonality. Engineering Learning Initiatives Undergraduate Research Award. Resulted in a conference paper, conference presentation, and submitted journal paper.
- **Joe Shin.** Undergraduate student at Cornell University (2015-2016). Research project: ADCS and propulsion subsystems design models for concurrent architecture development software.
- **Eric Grohn.** Undergraduate student at Cornell University (2014-2015). Research project: Astrodynamics approximations for fast mission analysis in concurrent architecture development software.

#### *Visiting students*

- **Gerard Morales i Riera.** Visiting student at Texas A&M University (Sep 2024–Apr 2025). Bachelor Thesis title: Deep reinforcement learning for the Earth Observation Multi-Agent Planning Problem.
- **David Fornos.** Visiting student at Texas A&M University (Sep 2022–Mar 2023). Bachelor Thesis title: Generative design of spacecraft constellations.
- **Jose Luis Haddad.** Visiting student at Texas A&M University (Feb 2020–Mar 2020). Project title: Information retrieval from unstructured text for the Daphne cognitive assistant.
- **Oscar Balcells Quintana.** Visiting student at Texas A&M University (Sep 2019–Mar 2020). Bachelor Thesis title: Development of an Anomaly Treatment Tool for Human Deep Space Exploration Missions.
- **Sergio Escosa Rodriguez.** Visiting student at Texas A&M University (Sep 2018–Mar 2019). Bachelor Thesis title: Development of a Cognitive Assistant for the Preliminary Design of Spacecrafts.
- **Antoni Viros Martin.** Visiting student at Cornell University MAE (Spring and Summer 2017). Bachelor Thesis title: Question-answering system and Historian skill for cognitive assistant for Earth observation satellite mission design. Resulted in a conference paper.
- **Arnau Prat Sala.** Visiting student at Cornell University MAE (Spring and Summer 2017). Bachelor Thesis title: Virtual reality environment, physical embodiment, and Critic skill for cognitive assistant for Earth observation satellite mission design. Resulted in a conference paper.
- **Ximo Gallud Cidoncha.** Visiting student at Cornell University MAE (2016-2017). Bachelor Thesis title: Agent-based simulation of systems with adaptive modularity. Resulted in a conference presentation and journal paper.
- **Pau Garcia-Buzzi.** Visiting student at Cornell University MAE (2015-2016). Thesis project: Bi-level optimization of communications and power subsystems for concurrent architecture development software.
- **Clara Abello.** Visiting student at Cornell University MAE (2014-2015). Thesis project: Knowledge discovery in system architecture using association rules learning.
- **Marc Sanchez Net.** Visiting student at MIT Aeronautics and Astronautics. Master’s thesis: Development of a performance simulation tool for the NASA Space Communication and Navigation system. February – December 2012.

- **Carlos Calvo Juan.** Visiting student at MIT Aeronautics and Astronautics. Master's thesis: Optimal scheduling of Earth observing missions using linear and integer programming. February – December 2010.

PROFESSIONAL  
SERVICE

**Advisory Committees**

- Member, Advisory Committee for Earth Observation, *European Space Agency*, January 2018 - December 2022

**Leadership in Technical Committees/Groups**

- Deputy Director, *AIAA Information Systems Group*, May 2023 - present
- Secretary, *AIAA Intelligent Systems Technical Committee*, Dec 2020 - May 2023

**Editorships**

- Associate Editor, *AIAA Journal of Aerospace Information Systems*, 2023-2026
- Guest Editor, *ASME Journal of Mechanical Design*, 2020-21
- Guest Editor, *AIAA Journal of Aerospace Information Systems*, 2016

**Conference Organizer/Co-Chair**

- *Technical Program Co-Chair, AIAA ASCEND Forum*, 2024-2025
- *Technical Program Deputy Chair, AIAA ASCEND Forum*, 2022-2023
- *Technical Program Member, AIAA Spring Symposium*, 2022
- *Intelligent Systems Topic Admin, AIAA ASCEND Forum*, 2020–2021
- *Best Paper Award Committee co-chair, IEEE Aerospace Conference*, 2014–present
- *Session co-chair, IEEE Aerospace Conference*, 2014–present
- *Session chair, AIAA SciTech Conference*, 2018–present
- *Workshop co-chair, AIAA Intelligent Systems Workshop*, 2017, 2022
- *Session co-chair, ASME IDETC Design Automation*, 2016–present
- *Workshop Chair, Federated Satellite Systems Workshop*, 2015
- *Technical Program Member, Federated Satellite Systems Workshop*, 2014–Present

**Referee Service**

**Grants**

- *NSF Panelist*, 2016, 2017, 2019 (3)
- *NASA Earth Science Technology Office External Reviewer*, 2015, 2017 (2)
- *Agencia Nacional de Promocion de la Investigacion, el Desarrollo Tecnologico y la Innovacion, Argentina*, 2021 (1)
- *Natural Sciences and Engineering Research Council of Canada, Discovery Grant External Reviewer*, 2015

**Journals**

- *ASME Journal of Mechanical Design*, 2015–present (20)
- *INCOSE Systems Engineering Journal*, 2015–present (16)
- *AIAA Journal of Spacecraft and Rockets*, 2010–present (11)
- *Acta Astronautica*, 2014–present (9)
- *AIAA Journal of Aerospace Information Systems*, 2015–present (8)
- *IEEE Systems Journal*, 2015–2018 (7)
- *Design Studies*, 2015–2021 (4)
- *Aerospace Engineering*, 2020–Present (3)
- *IEEE Transactions on Aerospace and Electronic Systems*, 2014–present (2)
- *Research in Engineering Design*, 2014–2017 (2)
- *Aerospace Science and Technology*, 2014 (2)

- *IEEE Journal on Selected Topics in Applied Earth Observations and Remote Sensing*, 2018,2019 (2)
- *Journal of Small Satellites*, 2017 (1)
- *Aerospace*, 2018 (1)
- *Robotics and Autonomous Systems*, 2020 (1)
- *Advances in Space Research*, 2021 (1)
- *IEEE Transactions on Mobile Computing*, 2020-2021 (1)
- *IEEE Transactions on Intelligent Transportation Systems*, 2020 (1)
- *IEEE Transactions on Vehicular Technology*, 2021 (1) item *IEEE Transactions on Cyber Physical Systems*, 2017 (1)
- *International Journal of GeoInformation*, 2019 (1)

### Conferences

- *IEEE Aerospace Conference*, 2014–present
- *ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference*, 2015–Present
- *AIAA SciTech Forum*, 2016–present
- *AIAA ASCEND Forum*, 2020–present
- *AIAA SPACE Forum*, 2016–2018
- *Conference on Systems Engineering Research (CSER)*, 2017, 2019, 2020
- *Council of Systems Engineering Universities (CESUN)*, 2016
- *IEEE Systems-of-Systems Conference*, 2017
- *IEEE Systems Conference*, 2015

### Technical Committee Memberships

- *AIAA Intelligent Systems Technical Committee*, 2016–present
  - Secretary (2020–present)
  - Workshop subcommittee chair (2018–present)
  - Conference subcommittee member (2018–present)

### PROFESSIONAL MEMBERSHIPS

- Associate Fellow, American Institute of Aeronautics and Astronautics (AIAA), 2009–present (AF Class of 2023)
- Senior Member, Institute for Electrical and Electronics Engineers (IEEE), 2009–present (SM since 2019)
- Member, American Society of Mechanical Engineers (ASME), 2014–present
- Member, International Council on Systems Engineering (INCOSE), 2014–present
- Member, American Geophysical Union (AGU), 2018–present

### OUTREACH AND VOLUNTEER SERVICE

#### Texas A&M University, College Station, TX

##### *Camp SOAR Instructor*

**Summer 2022, 2024**

- Organized a mini course on space mission design as part of the TAMU Summer Opportunities in Aerospace Research (SOAR) program for high school students. This included giving a short lecture to 60 students and doing a 10h lab on the design of space missions with 15 students. Developed a Google-Sheets-based concurrent design environment to facilitate a project involving the collaborative preliminary design of an Earth observation mission including the design of all the major subsystems.

#### Cornell University, Ithaca, NY

##### *4-H Career Exploration Workshop Organizer*

**June 2017**

- Organized a workshop “Mission to Mars” with 5 groups of 15 middle-schoolers as part of the Cornell 4-H Career Exploration program. This included developing

a simple concurrent design environment to facilitate the collaborative design of a mission to Mars, taking into account different design decisions and criteria.

**Massachusetts Institute of Technology**, Cambridge, MA

*Co-Instructor*

**September 2010**

- Led the design, implementation, and instruction of a project-based introductory course to space systems engineering for the Girl Scouts of New England.
  - Developed a GUI in MATLAB designed to simulate a concurrent engineering facility for a human exploration mission to Mars or the Moon.
  - Designed a 2h-class around the software and taught it to several groups of Girl Scouts.

HONORS AND  
AWARDS

AIAA Intelligent Systems Technical Committee

- Outstanding Service Award, 2024

Texas A&M Engineering Experiment Station (TEES)

- College of Engineering - TEES Young Faculty Fellow Award, 2022-2023

ASME Journal of Mechanical Design

- Guest Editor Award, 2021

Systems Engineering Journal

- Reviewer of the Year, 2020

Systems Engineering Journal

- Best Papers of 2018

2020 AIAA SciTech conference

- Intelligent Systems Best Paper Award, 2020

2018 International Conference on Design Computing and Cognition

- Co-author, Conference Best Paper Award, 2018

2013 IEEE Aerospace Conference

- Conference Best Paper Award, March 7 2013 (400+ entries)

Acta Astronautica

- Most cited Acta Astronautica article since 2012, 2017

La Caixa - Obra Social

- La Caixa Fellowship, 2008-2010

Universitat Politecnica de Catalunya

- Nortel Networks Scholarships for Academic Excellence, Given to top 10 students in year 4 of the school of electrical engineering, 2002

Asociacion Nacional de Quimicos de Espana

- Silver Medal, Spanish National Chemistry Olympics, 1998