Curriculum Vitae

Daniel R. Herber

A202F Engineering Building
Fort Collins, CO 80523
+1 (970) 491 1491
daniel.herber@colostate.edu
www.engr.colostate.edu/~drherber

Academic Appointments

8/19–Present *Assistant Professor*, Colorado State University, Department of Systems Engineering

1/18–7/19 *Postdoctoral Research Associate*, University of Illinois at Urbana-Champaign, NSF Center for Power Optimization of Electro-Thermal Systems (POETS)

Education

8/14–12/17 *Ph.D. in Systems and Entrepreneurial Engineering*, University of Illinois at Urbana-Champaign, adviser: James T. Allison, dissertation: *'Advances in combined architecture, plant, and control design'* [web] [pdf]

8/12–5/14 *M.S. in Systems and Entrepreneurial Engineering*, University of Illinois at Urbana-Champaign, adviser: James T. Allison, thesis: *'Dynamic system design optimization of wave energy converters utilizing direct transcription'* [web] [pdf]

8/08–12/11 *B.S. in General Engineering*, highest honors, University of Illinois at Urbana-Champaign, physics minor, applied statistics secondary field of concentration

Research Interests

Core computational design methods · design optimization · combined physical and control system design (control co-design) · model-based systems engineering

Secondary digital engineering/transformation · system architecture synthesis · architecture graph representations and enumeration · machine learning in engineering design · modeling and simulation of dynamic systems · multidisciplinary dynamic system design optimization · dynamic optimization · numerical methods for optimal control · direct transcription

Applications *energy systems* (ocean wave energy converters, wind turbines, hydrokinetic turbines, carbon capture systems) · *mechanical systems* (aircraft thrust reversers, strain-actuated solar arrays, vehicle suspensions) · *electrical systems* (analog filter circuits, power converters) · *thermal systems* (aircraft air cycle machines, thermal management networks)

Teaching

SYSE 567: Systems Engineering Architecture, Instructor, CSU (FA23, FA22, FA21, FA20)

SYSE 667: Advanced Model-Based Systems Engineering, Instructor, CSU (SP24, SP22, SP20 as co-instructor)

SYSE 580A1: Control Engineering for Systems Engineers, Instructor, CSU (SP23, SP21)

ENGR 510: Engineering Optimization: Method/Application, Instructor, CSU (FA23, FA22, FA21)

Funding

Front-End Engineering Design for a CO2 Capture System at Calpine's Delta Energy Center, DOE-sponsored project (Co-PI, 6 months, $170,000)

Digital Twin of ASET Lab, Woodward-sponsored project, (PI, 1 year, $62,000)

Phase II: Wind Energy with Integrated Servo-control (WEIS): A Toolset to Enable Controls Co-Design of Floating Offshore Wind Energy Systems, subaward from ARPA-E-sponsored project (PI, 2 years, $130,000)

Probabilistic Performance Assessment and Control Co-Design of Wave Farms, NSF-sponsored project (Co-PI, 3 years, $529,225)

A Computer Tool to Control Co-Design Hydrokinetic Energy Systems, ARPA-E-sponsored project (Co-PI, 3 years, $1,200,000)

Application of Model-Based Systems Engineering to EM-TRAS Systems, Woodward-sponsored project (PI, 9 months, $56,154)

NAWI Roadmapping, National Alliance for Water Innovation project funded by DOE-US Department of Energy (Co-PI, 1 year)

Synergistic Heat Pumped Thermal Storage and Flexible Carbon Capture System, ARPA-E-sponsored project (Co-PI, 1 year for Phase 1, $1,000,000)

Conceptual Level Thermal System Architecture Design and Model Based Systems Engineering, Air Force Research Laboratory-sponsored project (PI, 4 years, $244,976)

Wind Energy with Integrated Servo-control (WEIS): A Toolset to Enable Controls Co-Design of Floating Offshore Wind Energy Systems, subaward from ARPA-E-sponsored project (PI, 2.5 years, $84,389)

Honors and Awards

8/16 *List of Teachers Ranked as Excellent by Their Students Spring* 2016, based on student evaluations for position as a GE 312 teaching assistant.

5/15 *JPL Research Poster Conference Award*, co-author on poster titled "Strain Actuation & Sensing of SC Structures for Payload Jitter Suppression and Momentum Dumping" presented at the Jet Propulsion Laboratory Research and Development poster session on Nov. 12, 2014.

4/15 *Mavis Future Faculty Fellow*, selected as a MF3 Fellow for 2015–2016 whose program is designed to help doctoral students in the College of Engineering become the next generation of great engineering faculty.

4/13 *ISE Service Award*, given to recognize students who demonstrate leadership and commitment to the Dept. of Industrial and Enterprise Systems Engineering, UIUC.

8/12 *Best Technological Innovation*, given to an intern for the best technological innovation at the Research Park at UIUC, project with John Deere Technology Innovation Center.

Service and Leadership

22 *Reviewer*, NSF Graduate Research Fellowship Program (GRFP).

10/21–5/23 *Department Representative*, CSU Engineering Student Technology Committee (ESTC) and College of Engineering Technology Committee (CETC).

7/20–Present *Member*, CSU Systems Engineering Department Diversity, Equity, and Inclusion committee; lead of the Staff/Faculty/Student Cultural Competency working group.

8/18–Present *Session Co-organizer* for Active System Design/Control Co-Design topic, ASME International Design Engineering Technical Conferences.

4/12–Present *Peer Reviewer*, performed reviews for various journals and conference proceedings including:

ASME: Journal of Mechanical Design, Journal of Dynamic Systems, Measurement, and Control, International Design Engineering Technical Conferences, International Mechanical Engineering Congress and Exposition; *AIAA*: AIAA Journal, Journal of Aerospace Information Systems, Journal of Thermophysics and Heat Transfer, SciTech Forum; *IEEE*: Access, Conference on Decision and Control, Control Systems Letters, Transactions on Transportation Electrification; *MDPI*: Actuators, Applied Sciences, CivilEng, Electronics, Energies, Entropy, Healthcare, Machines, Materials, Mathematics, Processes, Sustainability, Systems; *Elsevier*: Aerospace Science and Technology, Computer-Aided Design; *Wiley*: International Journal of Robust and Nonlinear Control, Systems Engineering, Wind Energy; *Springer*: CEAS Aeronautical Journal, Optimization and Engineering, Structural and Multidisciplinary Optimization; *Other*: American Control Conference, Conference on Systems Engineering Research, Engineering Optimization, INCOSE International Symposium, International Conference on Energy Engineering and Environmental Protection, Journal of Vibration and Control, Optics Express

7/14 *College for Kids Kamp Kaboom—Mechanics of Trebuchets*, helped organize and run a 6 hour event demonstrating engineering principles to elementary school students.

4/13–17 *Junior Scientist Day—Mechanics of Trebuchets*, helped organize and run a science fair-like exhibit demonstrating engineering principles to elementary school students using trebuchets.

3/13–14 *Engineering Open House—Mechanics of Trebuchets*, helped organize and run a science fair exhibit demonstrating engineering principles to K-12 students.

Professional Memberships

8/20–Present *International Council on Systems Engineering*, Associate Member

8/12–Present *American Institute of Aeronautics and Astronautics*, Member

3/12–Present *American Society of Mechanical Engineers*, Member

Profiles

- *Google Scholar*, 915 citations, [link]
- *ResearchGate*, [link]
- *GitHub*, [link]
- *Matlab Central*, [link]
- *LinkedIn*, [link]
- *ORCID*, 0000-0003-4995-7375, [link]
- *CSU Systems Engineering*, [link]
- *Research Group Website*, [link]

Media

- *Systems engineering students gain access to key software for MBSE*, [link]
- *RWG Exchange Cafe Model-Based Structured Requirements in SysML*, [link]
- *More data, more collaboration: A conversation about the future of digital engineering*, [link]
- *Water scarcity will require agriculture to tap 'unconventional' sources like seawater, wastewater*, [link]
- *Systems engineering professor, NREL develop tools to make hydrokinetic turbines accessible*, [link]
- *Engineering researchers will use NSF grant to revolutionize wave farm design, lowering cost of renewable energy*, [link]
- *Faculty Friday: Dan Herber*, [link]

- *CAPSat: Undergrad students prepare to launch a satellite*, [link]
- *Dan Herber wins Mavis Future Faculty Fellow*, [link]
- *ISE Graduate Student Dan Herber: Multidisciplinary Optimization*, link no longer available, [link]
- *Interns have much to gain at Research Park*, [link]
- *Research Park honors most valuable interns of 2012*, [link]

Advising and Research Personnel

*Active and former research personnel:

1. ***Saeed Azad**, postdoctoral research associate

*Active and former Ph.D./D.Eng. students:

17. ***Sarah Rudder**, Systems Engineering (distance)
16. ***Ziraddin Gulumjanli**, Systems Engineering (on-campus)
15. ***Temitope Adeniji**, Systems Engineering (on-campus)
14. ***Michelle Villeneuve**, Systems Engineering (distance)
13. ***Eric Enos**, Systems Engineering (distance)
12. ***Terry Plonsky**, Systems Engineering (distance)
11. ***Lisa Marion**, Systems Engineering (distance)
10. ***Michael Kellogg**, Systems Engineering (distance)
9. ***Svetlana Lawrence**, Systems Engineering (distance)
8. ***James Wheaton**, Systems Engineering (on-campus)
7. ***Athul Sundarrajan**, Systems Engineering (on-campus)
6. ***LaTasha Starr**, Systems Engineering (distance)
5. ***H. Sinan Bank**, Systems Engineering (distance)
4. ***Anthony Sirico Jr.**, Systems Engineering (distance)
3. ***Daniel Call**, Systems Engineering (distance)
2. **Moe Huss**, Systems Engineering (distance, co-advised with Mike Borky), defense date: 7/23, dissertation: *'Development and quasi-experimental study of the scrum model-based system architecture process (sMBSAP) for agile model-based software engineering'* [web] [pdf]
1. **Andrew Miller**, Systems Engineering (distance), defense date: 3/22, dissertation: *'Applying model-based systems engineering in search of quality by design'* [web] [pdf]

*Active and former M.S. students:

5. **Maurice Ombogo**, Systems Engineering (on-campus), project: *'Analyzing lifecycle requirements of marine hydrokinetic energy systems'* [web] [pdf]
4. **Dalton Fox**, Systems Engineering (distance), project: *'Architecting an enterprise (system of systems) for a managed service provider to develop, deploy, and support cloud-based solutions using systems engineering and MBSE'* [web] [pdf]
3. **Roberto Vercellino**, Mechanical Engineering (on-campus, co-advised with Todd Bandhauer), defense date: 6/22, thesis: *'Analysis and control co-design optimization of natural gas power plants with carbon capture and thermal energy storage'* [web] [pdf]
2. **Jayesh Narsinghani**, Systems Engineering (on-campus, co-advised with Kamran Eftekhari Shahroudi), defense date: 10/21, thesis: *'Towards a model-based implementation in technology/platform life cycle development processes applied to a thrust reverser actuation system (TRAS) concept'* [web] [pdf]

1. **Athul Sundarrajan**, Systems Engineering (on-campus), defense date: 6/21, thesis: *'Some efficient open-loop control solution strategies for dynamic optimization problems and control co-design'* [web] [pdf]

*Active and former undergraduate students:

11. ***Joseph Sierra**, SURE SP24 researcher
10. ***Hung Thang**, SURE SP24 researcher
9. ***Austin Knolmayer**, SURE SP24 researcher
8. **Ian Gowen**, SURE SP23 researcher, SU23 researcher
7. **McKenzy Schroeder**, SURE SP23 researcher, SU23 researcher
6. **Derrick Hayward**, SURE SP22 researcher
5. **Juan Saucedo-Paez**, SURE SP21 researcher
4. **Aidan Brady**, SURE SP21 researcher
3. **Hannah Park**, SURE SP20 researcher
2. **Khang Ho**, SURE SP20 researcher
1. **Macklin Harrington**, SURE SP20 researcher

Publications — Journal Articles

* A. K. Sundarrajan, Y. H. Lee, J. T. Allison, D. S. Zalkind, **D. R. Herber**, 'Open-loop control co-design of semisubmersible floating offshore wind turbines using linear parameter-varying models', (to appear) ASME Journal of Mechanical Design, 146(4), p. 041 704, Apr 2024. doi: 10.1115/1.4063969 [web] [pdf]

* A. Sirico Jr, **D. R. Herber**, 'On the use of geometric deep learning for the iterative classification and down-selection of analog electric circuits', (to appear) ASME Journal of Mechanical Design, 146(5), p. 051 703, May 2024. doi: 10.1115/1.4063659 [web] [pdf]
Special Issue: Selected Papers from IDETC 2023

J14 S. Azad, **D. R. Herber**, 'An overview of uncertain control co-design formulations', ASME Journal of Mechanical Design, 145(9), p. 091 709, Sep 2023. doi: 10.1115/1.4062753 [web] [pdf]

J13 M. Huss, **D. R. Herber**, J. M. Borky, 'Comparing measured agile software development metrics using an agile model-based software engineering approach versus scrum only', Software, 2(3), pp. 310–331, Jul 2023. doi: 10.3390/software2030015 [web] [pdf]

J12 D. S. Birch, J. B. Narsinghani, **D. R. Herber**, T. H. Bradley, 'Human factors hazard modeling in the systems modeling language', Systems Engineering, 26(3), pp. 328–343, May 2023. doi: 10.1002/sys.21659 [web] [pdf]

J11 M. Huss, **D. R. Herber**, J. M. Borky, 'An agile model-based software engineering approach illustrated through the development of a health technology system', Software, 2(2), pp. 234–257, Apr 2023. doi: 10.3390/software2020011 [web] [pdf]

J10 B. J. Limb, E. J. Markey, R. Vercellino, S. D. Garland, M. D. Pisciotta, P. Psarras, **D. R. Herber**, T. M. Bandhauer, J. C. Quinn, 'Economic viability of using thermal energy storage for flexible carbon capture on natural gas power plants', Journal of Energy Storage, 55(D), p. 105 836, Nov 2022. doi: 10.1016/j.est.2022.105836 [web] [pdf]

J9 D. R. Call, **D. R. Herber**, 'Applicability of the diffusion of innovation theory to accelerate model-based systems engineering adoption', Systems Engineering, 25(6), pp. 574–583, Nov 2022. doi: 10.1002/sys.21638 [web] [pdf]

J8 C. A. Hejase, K. A. Weitzel, S. C. Stokes, B. M. Grauberger, R. B. Young, M. S. Arias-Paic, M. Kong, S. Chae, T. M. Bandhauer, T. Tong, **D. R. Herber**, S. Stout, A. Miara, Z. Huang, A. Evans, P. Kurup, M. Talmadge, A. Kandt, J. R. Stokes-Draut, J. Macknick, T. Borch, D. D. Dionysiou, 'Opportunities for treatment and reuse of agricultural drainage in the United States', ACS ES&T Engineering, 2(3), pp. 292–305, 2022. doi: 10.1021/acsestengg.1c00277 [web] [pdf]

J7 **D. R. Herber**, J. T. Allison, 'A problem class with combined architecture, plant, and control design applied to vehicle suspensions', ASME Journal of Mechanical Design, 141(10), p. 101 401, Oct 2019. doi: 10.1115/1.4043312 [web] [pdf]

J6 S. R. T. Peddada, **D. R. Herber**, H. Pangborn, A. G. Alleyne, J. T. Allison, 'Optimal flow control and single split architecture exploration for fluid-based thermal management', ASME Journal of Mechanical Design, 141(8), p. 083 401, Aug 2019. doi: 10.1115/1.4043203 [web] [pdf]

J5 **D. R. Herber**, J. T. Allison, 'Nested and simultaneous solution strategies for general combined plant and control design problems', ASME Journal of Mechanical Design, 141(1), p. 011 402, Jan 2019. doi: 10.1115/1.4040705 [web] [pdf]

J4 C. M. Chilan, **D. R. Herber**, Y. K. Nakka, S.-J. Chung, J. T. Allison, J. B. Aldrich, O. S. Alvarez-Salazar, 'Co-design of strain-actuated solar arrays for spacecraft precision pointing and jitter reduction', AIAA Journal, 55(9), pp. 3180–3195, Sep 2017. doi: 10.2514/1.J055748 [web] [pdf]

J3 **D. R. Herber**, T. Guo, J. T. Allison, 'Enumeration of architectures with perfect matchings', ASME Journal of Mechanical Design, 139(5), p. 051 403, May 2017. doi: 10.1115/1.4036132 [web] [pdf]

J2 **D. R. Herber**, A. P. Deshmukh, M. E. Mitchell, J. T. Allison, 'Project-based curriculum for teaching analytical design to freshman engineering students via reconfigurable trebuchets', Education Sciences, 6(1), p. 7, Feb 2016. doi: 10.3390/educsci6010007 [web] [pdf]

J1 J. T. Allison, **D. R. Herber**, 'Multidisciplinary design optimization of dynamic engineering systems', AIAA Journal, 52(4), pp. 691–710, Apr 2014. doi: 10.2514/1.J052182 [web] [pdf]
Special Section on Multidisciplinary Design Optimization

Publications — Conference Proceedings

* D. R. Call, S. Conrad, **D. R. Herber**, 'The effects of the assessed perceptions of MBSE on adoption', in *(to appear) INCOSE 2024 International Symposium*, Dublin, Ireland, Jul 2024. [web]

* S. Azad, **D. R. Herber**, S. Khanal, G. Jia, 'Site-dependent solutions of wave energy converter farms with surrogate models, control co-design, and layout optimization', in *(to appear) 2024 American Control Conference*, Toronto, Canada, Jul 2024. [web]

* E. S. Enos, **D. R. Herber**, 'Using hybrid system dynamics and discrete event simulations to identify high leverage targets for process improvement in a skill-based organizational structure', in *(to appear) IEEE 2024 International Systems Conference (SysCon)*, Montreal, QC, Canada, Apr 2024. [web]

* J. S. Wheaton, **D. R. Herber**, 'Digital requirements engineering with an INCOSE-derived SysML meta-model', in *(to appear) 2024 Conference on Systems Engineering Research*, Tucson, AZ, USA, Mar 2024. [web] [pdf]

C39 J. S. Wheaton, **D. R. Herber**, 'Seamless digital engineering: A grand challenge driven by needs', in *AIAA 2024 Science and Technology Forum and Exposition*, Orlando, FL, USA, Jan 2024. doi: 10.2514/6.2024-1053 [web] [pdf]

C38 A. Sirico Jr, **D. R. Herber**, 'Geometric deep learning towards the iterative classification of graph-based aircraft thermal management systems', in *AIAA 2024 Science and Technology Forum and Exposition*, Orlando, FL, USA, Jan 2024. doi: 10.2514/6.2024-0684 [web] [pdf]

C37 S. Lawrence, **D. R. Herber**, 'Towards the integration of hydrogen production with nuclear with model-based systems engineering', in *ANS Winter Meeting and Technology Expo*, Washington, D.C., USA, Nov 2023. [web]

C36 A. K. Sundarrajan, **D. R. Herber**, 'Using high-fidelity time-domain simulation data to construct multi-fidelity state derivative function surrogate models for use in control and optimization', in *ASME 2023 International Mechanical Engineering Congress & Exposition*, IMECE2023-112316, Nov 2023. doi: 10.1115/IMECE2023-112316 [web] [pdf]

C35 **D. R. Herber**, K. Eftekhari-Shahroudi, 'Building a requirements digital thread from concept to testing using model-based structured requirements applied to thrust reverser actuation system development', in *Recent Advances in Aerospace Actuation Systems and Components*, Toulouse, France, Sep 2023. [web] [pdf]

C34 S. Azad, **D. R. Herber**, 'Concurrent probabilistic control co-design and layout optimization of wave energy converter farms using surrogate modeling', in *ASME 2023 International Design Engineering Technical Conferences*, DETC2023-116896, Boston, MA, USA, Aug 2023. doi: 10.1115/DETC2023-116896 [web] [pdf]
Nominated as a Paper of Distinction

C33 A. Sirico Jr, **D. R. Herber**, 'On the use of geometric deep learning towards the evaluation of graph-centric engineering systems', in *ASME 2023 International Design Engineering Technical Conferences*, DETC2023-114592, Boston, MA, USA, Aug 2023. doi: 10.1115/DETC2023-114592 [web] [pdf]

C32 D. R. Call, **D. R. Herber**, 'A case for model-based systems engineering in an agile world and principles for growth', in *INCOSE 2023 Annual International Symposium*, Honolulu, HI, USA, Jul 2023, pp. 1612–1626. doi: 10.1002/iis2.13102 [web] [pdf]

C31 **D. R. Herber**, D. Dierker, S. S. Patnaik, 'Advancing model-based engineering through improved integration of domain-specific simulation and analysis using SysML-based models for unmanned aerial vehicles', in *AIAA 2023 Science and Technology Forum and Exposition*, AIAA 2023-0256, National Harbor, MD, USA, Jan 2023. doi: 10.2514/6.2023-0256 [web] [pdf]

C30 S. Azad, **D. R. Herber**, 'Investigations into uncertain control co-design implementations for stochastic in expectation and worst-case robust', in *ASME 2022 International Mechanical Engineering Congress & Exposition*, IMECE2022-95229, Columbus, OH, USA, Nov 2022. doi: 10.1115/IMECE2022-95229 [web] [pdf]

C29 H. Ross, M. Hall, **D. R. Herber**, J. Jonkman, A. K. Sundarrajan, T. T. Tran, A. Wright, D. Zalkind, N. Johnson, 'Development of a control co-design modeling tool for marine hydrokinetic turbines', in *ASME 2022 International Mechanical Engineering Congress & Exposition*, IMECE2022-94483, Columbus, OH, USA, Nov 2022. doi: 10.1115/IMECE2022-94483 [web] [pdf]

C28 B. J. Limb, E. J. Markey, R. Vercellino, J. Huyett, S. D. Garland, M. D. Pisciotta, P. Psarras, E. Meuleman, N. Fine, M. Abarr, **D. R. Herber**, J. C. Quinn, T. M. Bandhauer, 'Evaluating the economic viability of NGCC-SWITCC: Natural gas combined cycle system with integrated thermal storage and carbon capture', in *2022 Greenhouse Gas Control Technologies Conference*, Lyon, France, Oct 2022. doi: 10.2139/ssrn.4295563 [web] [pdf]

C27 S. Azad, **D. R. Herber**, 'Control co-design under uncertainties: Formulations', in *ASME 2022 International Design Engineering Technical Conferences*, DETC2022-89507, St. Louis, MO, USA, Aug 2022. doi: 10.1115/DETC2022-89507 [web] [pdf]

C26 R. Vercellino, E. J. Markey, B. J. Limb, M. D. Pisciotta, J. Huyett, S. D. Garland, T. M. Bandhauer, J. C. Quinn, P. Psarras, **D. R. Herber**, 'Control co-design optimization of natural gas power plants with carbon capture and thermal storage', in *ASME 2022 International Design Engineering Technical Conferences*, DETC2022-90021, St. Louis, MO, USA, Aug 2022. doi: 10.1115/DETC2022-90021 [web] [pdf]

C25 **D. R. Herber**, J. B. Narsinghani, K. Eftekhari-Shahroudi, 'Model-based structured requirements in sysml', in *IEEE 2022 International Systems Conference (SysCon)*, Apr 2022. doi: 10.1109/SysCon53536.2022.9773813 [web] [pdf]

C24 L. T. Starr, J. C. Baca, **D. R. Herber**, 'Sewing the digital transformation thread: A deeper look into model-based six sigma (mbss) and the model-based systems architecture processes (mbsap)', in *AIAA 2022 Science and Technology Forum and Exposition*, AIAA-2022-0095, San Diego, CA, USA, Jan 2022. doi: 10.2514/6.2022-0095 [web] [pdf]

C23 A. R. Miller, **D. R. Herber**, 'Digital engineering transformation of requirements analysis within model-based systems engineering', in *World Conference of the Society for Industrial and Systems Engineering*, Sep 2021. [web] [pdf]

C22 A. K. Sundarrajan, Y. H. Lee, J. T. Allison, **D. R. Herber**, 'Open-loop control co-design of floating offshore wind turbines using linear parameter-varying models', in *ASME 2021 International Design Engineering Technical Conferences*, DETC2021-67573, Aug 2021. doi: 10.1115/DETC2021-67573 [web] [pdf]

C21 R. Buettner, **D. R. Herber**, P. Abolmoali, S. S. Patnaik, 'An automated design tool for the generation and selection of optimal aircraft thermal management system architectures', in *AIAA Propulsion and Energy 2021 Forum*, AIAA 2021-3718, Aug 2021. doi: 10.2514/6.2021-3718 [web] [pdf]

C20 A. K. Sundarrajan, **D. R. Herber**, 'Towards a fair comparison between the nested and simultaneous control co-design methods using an active suspension case study', in *American Control Conference*, May 2021. doi: 10.23919/ACC50511.2021.9482687 [web] [pdf]
Invited Session

C19 J. Jonkman, A. Wright, G. Barter, M. Hall, J. T. Allison, **D. R. Herber**, 'Functional requirements for the WEIS toolset to enable controls co-design of floating offshore wind turbines', in *International Offshore Wind Technical Conference*, IOWTC2021-3533, Feb 2021. doi: 10.1115/IOWTC2021-3533 [web] [pdf]

C18 **D. R. Herber**, A. K. Sundarrajan, 'On the uses of linear-quadratic methods in solving nonlinear dynamic optimization problems with direct transcription', in *ASME 2020 International Mechanical Engineering Congress & Exposition*, IMECE2020-23885, Nov 2020. doi: 10.1115/IMECE2020-23885 [web] [pdf]

C17 **D. R. Herber**, 'Enhancements to the perfect matching approach for graph enumeration-based engineering challenges', in *ASME 2020 International Design Engineering Technical Conferences*, DETC2020-22774, Aug 2020. doi: 10.1115/DETC2020-22774 [web] [pdf]

C16 **D. R. Herber**, J. T. Allison, R. Buettner, P. Abolmoali, S. S. Patnaik, 'Architecture generation and performance evaluation of aircraft thermal management systems through graph-based techniques', in *AIAA 2020 Science and Technology Forum and Exposition*, AIAA 2020-0159, Orlando, FL, USA, Jan 2020. doi: 10.2514/6.2020-0159 [web] [pdf]

C15 T. Guo, **D. R. Herber**, J. T. Allison, 'Circuit synthesis using generative adversarial networks (GANs)', in *AIAA 2019 Science and Technology Forum and Exposition*, AIAA 2019-2350, San Diego, CA, USA, Jan 2019. doi: 10.2514/6.2019-2350 [web] [pdf]
Invited Paper

C14 T. Guo, **D. R. Herber**, J. T. Allison, 'Reducing evaluation cost for circuit synthesis using active learning', in *ASME 2018 International Design Engineering Technical Conferences*, DETC2018-85654, Quebec City, Canada, Aug 2018, V02AT03A011. doi: 10.1115/DETC2018-85654 [web] [pdf]

C13 S. R. T. Peddada, **D. R. Herber**, H. Pangborn, A. G. Alleyne, J. T. Allison, 'Optimal flow control and single split architecture exploration for fluid-based thermal management', in *ASME 2018 International Design Engineering Technical Conferences*, DETC2018-86148, Quebec City, Canada, Aug 2018, V02AT03A005. doi: 10.1115/DETC2018-86148 [web] [pdf]

C12 **D. R. Herber**, J. T. Allison, 'A problem class with combined architecture, plant, and control design applied to vehicle suspensions', in *ASME 2018 International Design Engineering Technical Conferences*, DETC2018-86213, Quebec City, Canada, Aug 2018, V02AT03A006. doi: 10.1115/DETC2018-86213 [web] [pdf]

C11 C. Lin, **D. R. Herber**, Vedant, Y. H. Lee, A. Ghosh, R. H. Ewoldt, J. T. Allison, 'Attitude control system complexity reduction via tailored viscoelastic damping co-design', in *AAS 2018 Guidance & Control Conference*, AAS 18-103, Breckenridge, CO, USA, Feb 2018. [web] [pdf]

C9 **D. R. Herber**, J. T. Allison, 'Nested and simultaneous solution strategies for general combined plant and controller design problems', in *ASME 2017 International Design Engineering Technical Conferences*, DETC2017-67668, Cleveland, OH, USA, Aug 2017, V02AT03A002. doi: 10.1115/DETC2017-67668 [web] [pdf]

C10 **D. R. Herber**, J. T. Allison, 'Unified scaling of dynamic optimization design formulations', in *ASME 2017 International Design Engineering Technical Conferences*, DETC2017-67676, Cleveland, OH, USA, Aug 2017, V02AT03A003. doi: 10.1115/DETC2017-67676 [web] [pdf]

C8 **D. R. Herber**, T. Guo, J. T. Allison, 'Enumeration of architectures with perfect matchings', in *ASME 2016 International Design Engineering Technical Conferences*, DETC2016-60212, Charlotte, NC, USA, Aug 2016, V02AT03A005. doi: 10.1115/DETC2016-60212 [web] [pdf]

C7 C. M. Chilan, **D. R. Herber**, Y. K. Nakka, S.-J. Chung, J. T. Allison, 'Co-design of strain-actuated solar arrays for precision pointing and jitter reduction', in *AIAA 2016 Science and Technology Forum and Exposition*, AIAA-2016-0162, San Diego, CA, USA, Jan 2016. doi: 10.2514/6.2016-0162 [web] [pdf]

C6 A. P. Deshmukh, **D. R. Herber**, J. T. Allison, 'Bridging the gap between open-loop and closed-loop control in co-design: A framework for complete optimal plant and control architecture design', in *2015 American Control Conference*, Chicago, IL, USA, Jul 2015, pp. 4916–4922. doi: 10.1109/ACC.2015.7172104 [web] [pdf]

C5 J. T. Allison, **D. R. Herber**, A. P. Deshmukh, 'Integrated design of dynamic sustainable energy systems', in *2015 International Conference on Engineering Design*, vol. Vol. 1, Milan, Italy, Jul 2015, pp. 299–308. [web] [pdf]

C4 **D. R. Herber**, J. W. McDonald, O. S. Alvarez-Salazar, G. Krishnan, J. T. Allison, 'Reducing spacecraft jitter during satellite reorientation maneuvers via solar array dynamics', in *AIAA/ISSMO 2014 Multidisciplinary Analysis and Optimization Conference*, AIAA2014-3278, Atlanta, GA, USA, Jun 2014, pp. 1–17. doi: 10.2514/6.2014-3278 [web] [pdf]

C3 **D. R. Herber**, J. T. Allison, 'Wave energy extraction maximization in irregular ocean waves using pseudospectral methods', in *ASME 2013 International Design Engineering Technical Conferences*, DETC2013-12600, Portland, OR, USA, Aug 2013, V03AT03A018. doi: 10.1115/DETC2013-12600 [web] [pdf]
Nominated as a Paper of Distinction

C2 J. T. Allison, **D. R. Herber**, 'Multidisciplinary design optimization of dynamic engineering systems', in *AIAA 2013 Multidisciplinary Design Optimization Specialist Conference*, AIAA 2013-1462, Boston, MA, USA, Apr 2013, pp. 1–30. doi: 10.2514/6.2013-1462 [web] [pdf]

C1 J. T. Allison, A. Kaitharath, **D. R. Herber**, 'Wave energy extraction maximization using direct transcription', in *ASME 2012 International Mechanical Engineering Congress & Exposition*, IMECE2012-86619, Houston, TX, USA, Nov 2012, pp. 485–495. doi: 10.1115/IMECE2012-86619 [web] [pdf]

Publications — Other

R5 T. Borch, D. D. Dionysiou, L. Katz, P. Xu, T. M. Bandhauer, R. Breckenridge, S. Chae, K. Ellison, J. Fox, B. M. Grauberger, C. A. Hejase, **D. R. Herber**, M. Kong, J. Macknick, D. Sedlak, S. C. Stokes, J. Stokes-Draut, T. Tong, K. A. Weitzel, R. B. Young, 'National alliance for water innovation (nawi) technology roadmap: Agriculture sector', NAWI, Technical Report DOE/GO-102021-5564, May 2021. doi: 10.2172/1782447 [web] [pdf]

R4 **D. R. Herber**, J. T. Allison, 'Approximating arbitrary impulse response functions with prony basis functions', Engineering System Design Lab, Urbana, IL, USA, Technical Report UIUC-ESDL-2019-01, Oct 2019. [web] [pdf]

T2 **D. R. Herber**, 'Advances in combined architecture, plant, and control design', Ph.D. Dissertation, University of Illinois at Urbana-Champaign, Urbana, IL, USA, Dec 2017. [web] [pdf]

R3 **D. R. Herber**, J. T. Allison, 'Enhancements to the perfect matching-based tree algorithm for generating architectures', Engineering System Design Lab, Urbana, IL, USA, Technical Report UIUC-ESDL-2017-02, Dec 2017. [web] [pdf]

R2 **D. R. Herber**, 'Basic implementation of multiple-interval pseudospectral methods to solve optimal control problems', Engineering System Design Lab, Urbana, IL, USA, Technical Report UIUC-ESDL-2015-01, Jun 2015. [web] [pdf]

R1 **D. R. Herber**, 'Solving optimal control problems using simscape models for state derivatives', Engineering System Design Lab, Urbana, IL, USA, Technical Report UIUC-ESDL-2014-01, Jul 2014. [web] [pdf]

T1 **D. R. Herber**, 'Dynamic system design optimization of wave energy converters utilizing direct transcription', M.S. Thesis, University of Illinois at Urbana-Champaign, Urbana, IL, USA, May 2014. [web] [pdf]

Presentations

P11 J. S. Wheaton, **D. R. Herber**, 'Digital requirements engineering using model-based structured requirements', *AIAA 2023 Rocky Mountain Annual Technical Symposium (Poster)*, Fort Collins, CO, USA, Sep 2023. [web] [pdf]

P10 S. S. Patnaik, D. Dierker, **D. R. Herber**, B. Raczkowski, M. Boyd, 'Digital twin prototype & digital thread for aircraft power thermal design and selection', *2022 Turbine Engine Technology Symposium*, Dayton, OH, USA, Sep 2022. [web]

P9 R. Vercellino, E. J. Markey, B. J. Limb, M. D. Pisciotta, J. Huyett, S. D. Garland, T. M. Bandhauer, J. C. Quinn, P. Psarras, **D. R. Herber**, 'Realizing profitable carbon capture on natural gas plants with thermal energy storage through optimization-based decision support', *2022 International Symposium on Sustainable Systems and Technology (Poster)*, Pittsburgh, PA, USA, Jun 2022. [web] [pdf]
Student Poster Competition Award

P8 E. J. Markey, R. Vercellino, B. J. Limb, M. D. Pisciotta, J. Huyett, S. D. Garland, P. Psarras, **D. R. Herber**, J. C. Quinn, T. M. Bandhauer, 'Economic viability of natural gas power plants with carbon capture and electrically charged thermal energy storage', *2022 International Symposium on Sustainable Systems and Technology*, Pittsburgh, PA, USA, Jun 2022. [web]

P7 B. J. Limb, E. J. Markey, R. Vercellino, S. D. Garland, M. D. Pisciotta, P. Psarras, **D. R. Herber**, T. M. Bandhauer, J. C. Quinn, 'Economic viability of thermal energy storage to support flexible operation of natural gas power plants with carbon capture', *2022 Thermal and Fluids Engineering Conference*, Las Vegas, NV, USA, May 2022. [web]

P5 B. J. Limb, E. J. Markey, S. D. Garland, R. Vercellino, M. D. Pisciotta, P. Psarras, J. Wilcox, **D. R. Herber**, T. M. Bandhauer, J. C. Quinn, 'Economic viability of flexible carbon capture for natural gas power plants', *TechConnect World Innovation Conference and Expo*, Oct 2021. [web]

P4 B. J. Limb, E. J. Markey, S. D. Garland, R. Vercellino, A. K. Sundarrajan, M. D. Pisciotta, J. Wilcox, **D. R. Herber**, T. M. Bandhauer, J. C. Quinn, 'The future of carbon capture: A story of the tortoise and the hare', *International Symposium on Sustainable Systems and Technology*, Jun 2021. [web] [pdf]

P3 **D. R. Herber**, A. K. Sundarrajan, 'Using the nested control co-design strategy for designing floating offshore wind turbines', *Wind Energy Science Conference*, May 2021. [web] [pdf]

P2 **D. R. Herber**, J. T. Allison, 'Control co-design: Achieving new functionality and performance via integrated physical and control system design', *ASME 2020 International Design Engineering Technical Conferences*, Aug 2020. [web] [pdf]

P1 J. T. Allison, **D. R. Herber**, 'Control co-design: Achieving new functionality and performance via integrated physical and control system design', *ASME 2019 International Mechanical Engineering Congress & Exposition*, Salt Lake City, UT, USA, Nov 2019. [web] [pdf]

Fort Collins, Colorado, USA, February 24, 2024