Justin M. Bradley

curriculum vitae

Richard L. and Carol S. McNeel Associate Professor of Computing
University of Nebraska–Lincoln

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1 EDUCATION AND EMPLOYMENT HISTORY

1.1 Education History

University of Michigan — Ann Arbor, MI
Ph.D., Aerospace Engineering — August 2014
Thesis: Toward Co-Design of Autonomous Aerospace Cyber-Physical Systems
Adviser: Dr. Ella M. Atkins
Area of Study: Cyber-physical systems, dynamics and control

University of Michigan — Ann Arbor, MI
M.S., Aerospace Engineering — December 2012
Area of Study: Cyber-physical systems, dynamics and control

Brigham Young University — Provo, UT
M.S., Electrical Engineering — August 2007
Thesis: Particle Filter Based Mosaicking for Forest Fire Tracking
Adviser: Dr. Clark Taylor
Area of Study: Computer vision, UAS applications for fire tracking

Brigham Young University — Provo, UT
B.S., Computer Engineering — August 2005
Emphasis: embedded systems, electrical engineering

1.2 Employment History

University of Nebraska — Lincoln, NE

- **Associate Professor** — Aug 2021–current
  School of Computing
- **Faculty Fellow** — Mar 2021–current
  National Strategic Research Institute (NSRI)
- **Complete Engineer Faculty Fellow** — Aug 2022–current
  College of Engineering
- **Courtesy Appointment** — Jan 2018–current
  Electrical and Computer Engineering Department
- **Courtesy Appointment** — Jan 2017–current
  Mechanical and Materials Engineering Department
- **Assistant Professor** — August 2015–Aug 2021
  Computer Science and Engineering Department
- **Co-director** — August 2015–current
  Nebraska Intelligent MoBile Unmanned Systems (NIMBUS) Lab

U.S. Air Force Research Lab

- **Summer Faculty Fellow**   May 2021–Jul 2021
  AFRL/RW, Eglin AFB, Destin, FL
  Research group: *Single and Multi-Agent Navigation and Autonomy*

- **Summer Faculty Fellow**   May 2020–Jul 2020
  AFRL/RQ-AFRL-Aerospace Systems, Wright Patterson AFB, Dayton, OH
  Research group: *Cooperative Control of Autonomous Systems in Uncertain Information Environments*

University of Michigan   Ann Arbor, MI

- **Research Fellow (Postdoc)**   August 2014–July 2015
  Department of Aerospace Engineering

Lawrence Livermore National Laboratory   Livermore, CA

- **Control System Software Engineer**   September 2007–December 2009

2   RESEARCH ACCOMPLISHMENTS

2.1   Publication Record

The following subscripts are used to indicate student and other co-authors under my supervision:
1: Undergraduate student
2: Masters student
3: Ph.D. student
4: Postdoctoral researcher

NOTE: In my publications I place myself as last author (organizing author) on papers with students, unless I did the super-majority of the work.

2.1.1   Peer Reviewed Journal Publications in Print

[J13] A. Plowcha[3], **J. Bradley**, J. Hogberg, T. Ammon, M. Nail, B. Duncan, and C. Detweiler, "Autonomous long-range sensor emplacement using unmanned aircraft systems," *Field Robotics*, vol. 2, pp. 437–467, 2022. doi: 10.55417/fr.2022016. [Online]. Available: https://web.archive.org/web/20220704150716id_/https://fieldrobotics.net/Field_Robotics/Volume_2_files/Vol2_16.pdf

[J12] X. Zhang[3] and **J. Bradley**, "Rethinking sampled-data control for unmanned aircraft systems," *Sensors*, vol. 22, no. 4, Feb 2022. doi: 10.3390/s22041525. [Online]. Available: https://www.mdpi.com/1424-8220/22/4/1525

[J11] Z. Sadri-Moshkenani, **J. Bradley**, and G. Rothermel, "Survey on test case generation, selection and prioritization for cyber-physical systems," *Software Testing, Verification and Reliability*, Sep 2021. doi: 10.1002/stvr.1794. [Online]. Available: https://onlinelibrary.wiley.com/doi/abs/10.1002/stvr.1794

[J10] X. Zhang[3] and **J. Bradley**, "Controller design for time-varying sampling, co-regulated systems," *IEEE Control Systems Letters*, vol. 5, no. 6, pp. 2132–2137, Dec 2020. doi: 10.1109/LCSYS.2020.3044261. [Online]. Available: https://doi.org/10.1109/LCSYS.2020.3044261

[J9] Z. Shang[2], **J. Bradley**, and Z. Shen, "A co-optimal coverage path planning method for aerial scanning of complex structures," *Expert Systems with Applications*, vol. 158, Nov 2020. doi: 10.1016/j.eswa.2020.113535. [Online]. Available: https://doi.org/10.1016/j.eswa.2020.113535

[J8] C. Fernando[3], C. Detweiler, and **J. Bradley**, "Co-regulated consensus of cyber-physical resources in multi-agent unmanned aircraft systems," *Electronics*, vol. 8, no. 5, May 2019. doi: 10.3390/electronics8050569. [Online]. Available: http://www.mdpi.com/2079-9292/8/5/569

[J7] T. Shen, C. A. Nelson, and **J. Bradley**, "Design of a model-free cross-coupled controller with application to robotic NOTES," *Journal of Intelligent & Robotic Systems*, Jun 2018. doi: 10.1007/s10846-018-0836-2. [Online]. Available: https://doi.org/10.1007/s10846-018-0836-2

[J6] R. D. Eubank, **J. M. Bradley**, and E. M. Atkins, "Energy-Aware Multi-Flight Planning for an Unattended Seaplane - Flying Fish," *AIAA Journal of Aerospace Information Systems*, pp. 1–19, Feb 2017. doi: 10.2514/1.I010484. [Online]. Available: https://doi.org/10.2514/1.I010484

[J5] **J. M. Bradley** and E. M. Atkins, "Optimization and Control of Cyber-Physical Vehicle Systems," *Sensors*, vol. 15, no. 9, p. 23020, Sep 2015. doi: 10.3390/s150923020. [Online]. Available: http://www.mdpi.com/1424-8220/15/9/23020

[J4] **J. M. Bradley** and E. M. Atkins, "Coupled Cyber-Physical System Modeling and Coregulation of a CubeSat," *IEEE Transactions on Robotics*, vol. 31, no. 2, pp. 443–456, April 2015. doi: 10.1109/TRO.2015.2409431. [Online]. Available: https://doi.org/10.1109/TRO.2015.2409431

[J3] **J. M. Bradley** and E. M. Atkins, "A Cyber-Physical Optimization Approach to Mission Success for Unmanned Aircraft Systems," *Journal of Aerospace Information Systems*, vol. 11, no. 1, pp. 48–60, January 2014. doi: 10.2514/1.I010105. [Online]. Available: https://doi.org/10.2514/1.I010105

[J2] **J. M. Bradley** and E. M. Atkins, "Toward Continuous State-Space Regulation of Coupled Cyber-Physical Systems," *Proceedings of the IEEE*, vol. 100, no. 1, pp. 60–74, January 2012. doi: 10.1109/JPROC.2011.2161239. [Online]. Available: https://doi.org/10.1109/JPROC.2011.2161239

[J1] **J. M. Bradley** and C. N. Taylor, "Georeferenced Mosaics for Tracking Fires Using Unmanned Miniature Air Vehicles," *Journal of Aerospace Computing, Information, and Communication*, vol. 8, no. 10, pp. 295–309, October 2011. doi: 10.2514/1.45342. [Online]. Available: https://doi.org/10.2514/1.45342

2.1.2 Peer Reviewed Journal Publications Submitted for Review

2.1.3 Conference Proceedings: Peer Reviewed

[C35] D. Rico[3], F. Muñoz Arriola, **J. Bradley**, and C. Detweiler, "Analytics for real-time inertial localization of the tethered aircraft unmanned system," in *International Symposium on Experimental Robotics (ISER)*. Springer International Publishing, 2023

[C34] H. Michaelson[1], N. Pettit[1], V. Annabhemoju, S. Nie, and **J. Bradley**, "Link budgeting and interference management for uav networks in 5g and beyond," in *Proceedings of the Twenty-Fourth International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing*, ser. MobiHoc '23. New York, NY, USA: Association for Computing Machinery, 2023. doi: 10.1145/3565287.3617627. ISBN 9781450399265 p. 486–491. [Online]. Available: https://doi.org/10.1145/3565287.3617627

[C33] G. Phillips[3], **J. Bradley**, and P. Ganesh, "GPS-Denied State Estimation for Blue/NDAA Unmanned Multi-Rotor Vehicles," in *AIAA SciTech 2023 Forum*, 2023. doi: 10.2514/6.2023-2666. [Online]. Available: https://doi.org/10.2514/6.2023-2666

[C32] **J. Bradley**, C. Fleming, K. Y. Rozier, and A. Pritchett, "Impact and influence of cyber-physical systems research on autonomous aerospace systems," in *AIAA SciTech 2023 Forum*, 2023. doi: 10.2514/6.2023-2669. [Online]. Available: https://doi.org/10.2514/6.2023-2669

[C31] K. Muvva[3], K. Samal, **J. Bradley**, and M. Wolf, "A closed loop perception subsystem for small unmanned aerial systems," in *AIAA SciTech 2023 Forum*, 2023. doi: 10.2514/6.2023-2673. [Online]. Available: https://doi.org/10.2514/6.2023-2673

[C30] C. N. Fondje, D. Rico, **J. Bradley**, C. Detweiler, J. George, P. Sharma, and B. S. Riggan, "Nighttime unmanned aerial system counter-surveillance using domain adaptive objection detection and thermal imaging," in *Infrared Technology and Applications XLVIII*, B. F. Andresen, G. F. Fulop, and L. Zheng, Eds., vol. 12107, International Society for Optics and Photonics. SPIE, 2022. doi: 10.1117/12.2621398. ISBN 9781510650909 p. 121071N. [Online]. Available: https://doi.org/10.1117/12.2621398

[C29] X. Zhang[3] and **J. Bradley**, "Computing for control and control for computing," in *2021 Design, Automation & Test in Europe Conference & Exhibition (DATE)*, 2021. doi: 10.23919/DATE51398.2021.9474058 pp. 469–474. [Online]. Available: https://10.23919/DATE51398.2021.9474058

[C28] A. Plowcha[3], J. Hogberg, C. Detweiler, and **J. Bradley**, "Online soil classification using a UAS sensor emplacement system," in *International Symposium on Experimental Robotics (ISER)*. Springer International Publishing, 2020. doi: 10.1007/978-3-030-71151-1_16 pp. 174–184. [Online]. Available: https://doi.org/10.1007/978-3-030-71151-1_16

[C27] S. G. Manyam, D. Casbeer, I. E. Weintraub, D. M. Tran, **J. M. Bradley**, and S. Darbha, "Quadratic bezier curves for multi-agent coordinated arrival in the presence of obstacles," in *AIAA Scitech 2021 Forum*. doi: 10.2514/6.2021-1879. [Online]. Available: https://arc.aiaa.org/doi/abs/10.2514/6.2021-1879

[C26] K. Muvva[3], **J. M. Bradley**, M. Wolf, and T. Johnson, "Assuring learning-enabled components in small unmanned aircraft systems," in *AIAA Scitech 2021 Forum*. doi: 10.2514/6.2021-0994. [Online]. Available: https://arc.aiaa.org/doi/abs/10.2514/6.2021-0994

[C25] C. Fernando[3], C. Detweiler, and **J. Bradley**, "Co-regulated information consensus with delays for multi-agent UAS*," in *2020 59th IEEE Conference on Decision and Control (CDC)*, 2020. doi: 10.1109/CDC42340.2020.9304068 pp. 180–187. [Online]. Available: https://doi.org/10.1109/CDC42340.2020.9304068

[C24] B. Balasubramaniam[2], S. Elbaum, H. Bagheri, and **J. Bradley**, "Investigating controller evolution and divergence through mining and mutation," in *2020 IEEE/ACM 11th International Conference on Cyber-Physical Systems (ICCPS)*, 2020. doi: 10.1109/ICCPS48487.2020.00022 pp. 151–161. [Online]. Available: https://doi.org/10.1109/ICCPS48487.2020.00022

[C23] **J. M. Bradley** and H. Bagheri, "Control software: Research directions in the intersection of control theory and software engineering," in *AIAA Scitech 2020 Forum*, 2020. doi: 10.2514/6.2020-2102 p. 2102. [Online]. Available: https://doi.org/10.2514/6.2020-2102

[C22] X. Zhang[3] and **J. Bradley**, "Stability analysis for a class of resource-aware, co-regulated systems," in *2019 IEEE 58th Conference on Decision and Control (CDC)*, Dec 2019. doi: 10.1109/CDC40024.2019.9029267. ISSN 2576-2370 pp. 193–200. [Online]. Available: https://doi.org/10.1109/CDC40024.2019.9029267

[C21] H. Li[3], Y. Qian, S. Asgarpoor, and **J. Bradley**, "PMSM current management with overcurrent

regulation," in *2019 IEEE Applied Power Electronics Conference and Exposition (APEC)*, March 2019. doi: 10.1109/APEC.2019.8722290. ISSN 2470-6647 pp. 1848–1852. [Online]. Available: https://ieeexplore.ieee.org/abstract/document/8722290

[C20] L. Kruse[1], **J. Bradley**, and M. Wolf, "A Control Authority Switching System for Avoiding Multicopter Loss of Control Using a Markov Decision Process," in *2019 AIAA SciTech Forum*. San Diego, CA: American Institute of Aeronautics and Astronautics, Jan. 2019. doi: 10.2514/6.2019-1688. [Online]. Available: https://doi.org/10.2514/6.2019-1688

[C19] M. Lussier[2], **J. M. Bradley**, and C. Detweiler, "Extending Endurance of Multicopters: The Current State-of-the-Art," in *2019 AIAA SciTech Forum*. San Diego, CA: American Institute of Aeronautics and Astronautics, Jan. 2019. doi: 10.2514/6.2019-1790. [Online]. Available: https://doi.org/10.2514/6.2019-1790

[C18] D. Yeo, N. Rehm, **J. Bradley**, and I. Chopra, "Flow-Aware Computational Wings for Improved Gust Mitigation on Fixed-Wing Unmanned Aerial Systems," in *2019 AIAA SciTech Forum*. San Diego, CA: American Institute of Aeronautics and Astronautics, Jan. 2019. doi: 10.2514/6.2019-1689. [Online]. Available: https://doi.org/10.2514/6.2019-1689

[C17] C. Fernando[3], C. Detweiler, and **J. Bradley**, "Co-regulating communication for asynchronous information consensus," in *2018 IEEE Conference on Decision and Control (CDC)*, Dec 2018. doi: 10.1109/CDC.2018.8619787. ISSN 2576-2370 pp. 6994–7001. [Online]. Available: https://doi.org/10.1109/CDC.2018.8619787

[C16] L. Hall[1], U. Acharya, **J. Bradley**, and B. Duncan, "Inference of User Qualities in Shared Control of CPHS: A Contrast in Users," in *IFAC Cyber-Physical Human Systems*, Dec 2018. doi: 10.1016/j.ifacol.2019.01.047. [Online]. Available: https://doi.org/10.1016/j.ifacol.2019.01.047

[C15] A. Plowcha[3], Y. Sun, C. Detweiler, and **J. Bradley**, "Predicting Digging Success for Unmanned Aircraft System Sensor Emplacement," in *2018 International Symposium on Experimental Robotics (ISER)*, Nov 2018. doi: 10.1007/978-3-030-33950-0. [Online]. Available: https://doi.org/10.1007/978-3-030-33950-0_14

[C14] L. Kruse[1], A. Plowcha, and **J. M. Bradley**, "Experimental testing and validation of cyber-physical coregulation of a cubesat," in *2018 AIAA SPACE and Astronautics Forum and Exposition*, ser. AIAA SPACE Forum. American Institute of Aeronautics and Astronautics, Sep 2018. doi: 10.2514/6.2018-5212 0. [Online]. Available: https://doi.org/10.2514/6.2018-5212

[C13] L. Kruse[1] and **J. Bradley**, "A hybrid, actively compliant manipulator/gripper for aerial manipulation with a multicopter," in *2018 IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR)*, Aug 2018. doi: 10.1109/SSRR.2018.8468651. ISSN 2475-8426 pp. 1–8. [Online]. Available: https://doi.org/10.1109/SSRR.2018.8468651

[C12] U. Acharya, S. Kunde, L. Hall[1], B. A. Duncan, and **J. M. Bradley**, "Inference of user qualities in shared control," in *2018 IEEE International Conference on Robotics and Automation (ICRA)*, May 2018. doi: 10.1109/ICRA.2018.8461193. ISSN 2577-087X pp. 588–595. [Online]. Available: https://doi.org/10.1109/ICRA.2018.8461193

[C11] X. Zhang[3], S. Doebbeling[2], and **J. Bradley**, "Co-regulation of computational and physical effectors in a quadrotor unmanned aircraft system," in *Proceedings of the 9th ACM/IEEE International Conference on Cyber-Physical Systems*, ser. ICCPS '18. Porto, Portugal: IEEE Press, 2018. doi: 10.1109/ICCPS.2018.00020. ISBN 978-1-5386-5301-2 pp. 119–129. [Online]. Available: https://doi.org/10.1109/ICCPS.2018.00020

[C10] A. Shankar, S. Doebbeling[2], and **J. Bradley**, "Toward a cyber-physical quadrotor: Characterizing trajectory following performance," in *2017 International Conference on Unmanned Aircraft Sys-

tems (ICUAS), June 2017. doi: 10.1109/ICUAS.2017.7991394 pp. 133–142. [Online]. Available: https://doi.org/10.1109/ICUAS.2017.7991394

[C9] E. Foruzan[2], S. Asgarpoor, and **J. M. Bradley**, "Hybrid system modeling and supervisory control of a microgrid," in *2016 North American Power Symposium (NAPS)*, Sept 2016. doi: 10.1109/NAPS.2016.7747840 pp. 1–6, denver, CO. [Online]. Available: https://doi.org/10.1109/NAPS.2016.7747840

[C8] **J. M. Bradley**, M. L. Clark, E. M. Atkins, and K. G. Shin, "Mission-Aware Cyber-Physical Optimization on a Tabletop Satellite," in *AIAA Infotech@Aerospace*, Boston, MA, August 2013. doi: 10.2514/6.2013-4807. [Online]. Available: https://doi.org/10.2514/6.2013-4807

[C7] E. M. Atkins and **J. M. Bradley**, "Aerospace Cyber-Physical Systems Education," in *AIAA Infotech@Aerospace*, Boston, MA, August 2013. doi: 10.2514/6.2013-4809. [Online]. Available: https://doi.org/10.2514/6.2013-4809

[C6] **J. M. Bradley** and E. M. Atkins, "Multi-Disciplinary Cyber-Physical Optimization for Unmanned Aircraft Systems," in *AIAA Infotech@Aerospace*, Garden Grove, CA, June 2012. doi: 10.2514/6.2012-2447. [Online]. Available: https://doi.org/10.2514/6.2012-2447

[C5] **J. M. Bradley** and E. M. Atkins, "Computational-physical state co-regulation in cyber-physical systems," in *Proceedings of the 2011 IEEE/ACM Second International Conference on Cyber-Physical Systems*, ser. ICCPS '11. Washington, DC, USA: IEEE Computer Society, 2011. doi: 10.1109/ICCPS.2011.27. ISBN 978-0-7695-4361-1 pp. 119–128. [Online]. Available: https://doi.org/10.1109/ICCPS.2011.27

[C4] **J. M. Bradley** and C. N. Taylor, "Particle Filter Based Mosaicking for Tracking Forest Fires," in *AIAA Conference on Guidance, Navigation, and Control*, Hilton Head, SC, August 2007. doi: 10.2514/6.2007-6757. [Online]. Available: https://doi.org/10.2514/6.2007-6757

[C3] A. Rodriguez, E. Andersen, **J. M. Bradley**, and C. N. Taylor, "Wind Estimation Using an Optical Flow Sensor on a Miniature Air Vehicle," in *AIAA Conference on Guidance, Navigation, and Control*, vol. 6614, Hilton Head, SC, August 2007. doi: 10.2514/6.2007-6614. [Online]. Available: https://doi.org/10.2514/6.2007-6614

[C2] **J. Bradley**, B. Prall, R. Beard, and C. Taylor, "An Unmanned Aerial Vehicle Project For Undergraduates," in *The Forty-Second Annual International Telemetering Conference and Technical Exhibition*, vol. 42. San Diego, CA: International Foundation for Telemetering, October 2006, pp. 563–572

[C1] R. Holt, J. Egbert, **J. Bradley**, R. Beard, C. Taylor, and T. McLain, "Forest Fire Monitoring Using Multiple Unmanned Air Vehicles," in *The Eleventh Forest Service Remote Sensing Applications Conference*, vol. 1. Salt Lake City, UT: American Society for Photogrammetry and Remote Sensing, April 2006, pp. 54–66

2.1.4 Software Artifacts

- Co-optimal Coverage Path Planner, https://github.com/szx0112/Co-optimalCoveragePathPlanner
- Investigating Controller Evolution and Divergence through Mining and Mutation, https://cse.unl.edu/~jbradley/CE/controllerevolution.html

2.1.5 Invited Talks/Keynote Speeches

12. "Preparing for AIAA Associate Fellow Nomination and Selection," AIAA Intelligent Systems Technical Committee Seminar Series, Sponsor: Yan Wan. Oct 24, 2023

11. "NIMBUS Lab: Multi-Agent Drone and Swarming Technology," Emerging Tech Talk U.S. Department of Commerce, Sponsor: Tongele Tongele. May 9, 2023

10. "Deployment-Informed Design and Implementation of Unmanned Aircraft Systems," DEVCOM ARL Colloquium, Sponsor: Jemin George. Nov 30, 2022

9. "Foundations for Cyber-Physical Unmanned Aircraft Systems," Aerospace Control and Guidance Systems Committee (ACGSC), Sponsor: John Valasek. Oct 28, 2022

8. "Nebraska Intelligent MoBile Unmanned Systems (NIMBUS) Lab," NU System 2022 Congressional Staff Visit, Solutions To Prepare and Protect Our Nation, Sponsor: Jessie Herrmann. Oct 26, 2022

7. "A Co-regulated Cyber-Physical Autopilot for UAS," AIAA Intelligent Systems Technical Committee Seminar Series, Sponsor: Yan Wan. Dec 1, 2021

6. "Co-Regulation of Cyber and Physical Resources in Controllers for Single- and Multi-Agent Unmanned Aircraft Systems," University of Pennsylvania, PRECISE Seminar, Sponsor: Rahul Mangharam. Feb 26, 2020

5. "Foundations of Resource-Aware Autonomy in Cyber-Physical Aerospace Systems," Vanderbilt University, EECS Department, EECS Seminar Series. Sponsor: Taylor Johnson. Dec 5, 2019

4. "Control and CS.* in Aerospace Systems," University of Nebraska - Lincoln, Department of Mathematics, Mathematics Colloquium Series. Sponsor: Petronela Radu. Nov 9, 2018

3. "Control and CS.* in Aerospace Systems," University of Colorado Boulder, Aerospace Engineering Sciences Department, Robotics, Controls, and Dynamic Systems Seminar. Sponsor: Eric Frew. Oct 4, 2018

2. "A Cyber-Physical Quadrotor," University of Nebraska - Lincoln, Department of Mathematics, Continuum Mechanics Seminar. Lincoln, NE. Sponsor: Petronela Radu. Sept 21, 2017

1. "A Cyber-Physical Quadrotor," Colorado State University, Computer Science Department, BMAC Colloquium. Fort Collins, CO. Sponsor: Hamidreza Chitsaz. April 3, 2017

2.1.6 Significant Publicity and Media Appearances

- *Unknown: Killer Robots*   July 2023
    Netflix
    https://www.netflix.com/title/81473681
    Trailer: https://www.youtube.com/watch?v=YsSzNOpr9cE&ab_channel=Netflix
    IMDB Entry: https://www.imdb.com/title/tt27837442/

- *THE FUTURE IS NOW! Discussing robotics and artificial intelligence in Nebraska!* July 12, 2023
    UNL College of Engineering Complete Engineer Vidcast
    https://youtu.be/ygBt_FHjE4w?si=1BN3huwpIxK81CbH

- *Drones as a Research Tool*   Jan 2023
    Tech Refactored Podcast
    https://mediahub.unl.edu/media/20897

- *University of Nebraska Lab Developing Drone-Swarm 'Mothership'*   July 21, 2022
    IoT World Today
    https://www.iotworldtoday.com/transportation-logistics/university-of-nebraska-lab-developing-drone-swarm-mothership-

- *UNL drone researchers receive $250,000 in funding for recon missions*   July 21, 2022
    KLKN TV

- *As Labor Shortages Continue, Could Robots Provide An Answer?* Dec 3, 2021
  Nebraska Public Media

- *Dr. Justin Bradley, Assistant Professor of Computer Science and Engineering at UNL* June 2021
  KFOR Lincoln Live

2.1.7 Other Publications

[2] **J. M. Bradley** and E. M. Atkins, "Position Paper: Cyber-Physical Systems," NIST Foundations for Innovation in Cyber-Physical Systems Workshop, Chicago, IL, Tech. Rep., March 2012

[1] **J. M. Bradley** and E. M. Atkins, "Co-Regulation of Cyber Physical Systems," 2011 Automotive CPS Workshop, Troy, MI, Tech. Rep., February 2011

2.2 Grantsmanship Record

2.2.1 Internally Funded Research Grants

[G15] UNL College of Arts and Sciences. *Conserving Water in Pakistan Through Water Monitoring Using Unmanned Aircraft Systems*. Total: $10,000 (apportionment: 100%), 08/2019–08/2020, PI: Bradley

  Description: Develop a collaborative, symbiotic relationship between PI Bradley and Dr. Nasir at the University of Central Punjab in Pakistan in support of developing long-term autonomy of Unmanned Aircraft Systems (UAS) while simultaneously improving water monitoring, and hence water conservation in Pakistan.

2.2.2 Externally Funded Research Grants

[G13] United States Geological Survey. *Improved processing and delivery of stationary and mobile cosmic-ray neutron sensor data*. Total: $349,822 (apportionment: 20%), 03/2023–02/2025, PI: Franz, Collaborator: Bradley, Larios, USGS G23AC00156-00

  Description: Development of a cyber infrastructure, and improved/renewed data processing algorithms from the scientific literature to update the Cosmic-Ray Neutron Sensor (CRNS) system. CRNS provides critical soil water information to stakeholders including the National Water Information System.

[G12] National Science Foundation. *REU Site: Undergraduate Research Opportunities in Unmanned Systems Foundations and Applications*. Total: $424,759 (apportionment: 50%), 03/2023–02/2026, PI: Bradley, Co-PI: Tran, Senior Personnel: Duncan, Nie, Detweiler, NSF-2244116

  Description: Support for a REU site to provide undergraduates with a comprehensive research experience in the context of unmanned systems. Particular focus is given to students from historically underrepresented groups and from institutions in the Midwest that lack research opportunities. NOTE: all spending is on the collective group of students from one account.

[G11] USDA National Institute of Food and Agriculture. *CPS: Medium: Dig, Sip, Breathe: Automated Monitoring of Carbon and Water Cycles in Agriculture*. Total: $990,697 (apportionment: 53%), 01/2023–12/2025, PI: Bradley, Co-PI: Detweiler, Franz, Muñoz-Arriola, USDA 2023-67021-38977

> **Description:** Novel planning, sampling, and learning algorithms for large-scale, agricultural soil water and carbon monitoring and verification via a team of Unmanned Aircraft Systems. Soil samples will be collected by a free flying UAS, while strategically chosen columns of air will be monitored by tethered UAS.

[G10] National Science Foundation. *NRI: Collaborative Research: Adaptive Multi-Robot Configurable Teams Investigating Changing Ecosystem*. Total: $1,206,251, UNL: $991,860 (apportionment: 49%), 10/2022–09/2025, PI: Duncan, Co-PI: Bradley, Detweiler, CNS-2221648

> **Description:** Develop the foundational planning, interaction, and learning algorithms for a heterogeneous, multi-agent robotic system to track beaver migration in difficult-to-access, arctic environments.

[G9] National Strategic Research Institute. *Proposal to Support the U.S. Army Combat Capabilities Development Command Army Research Laboratory (DEVCOM ARL): Multi-Agent UAS Teaming for Extended ISTAR and Autonomous Resupply*. Total: $167,732 (apportionment: 40%), 03/2022–08/2023, PI: Bradley, Co-PI: Detweiler, Duncan, Riggan, NSRI #FA4600-20-D-0003

> **Description:** Design, build, and demonstrate multi-agent autonomous, ISTAR, swarm technology during a tactical field experiment. A machine-learning-based cooperative control strategy will track targets identified by a visual/IR detection system.

[G8] National Science Foundation. *CAREER: Foundations for a Resource-Aware, Cyber-Physical Vehicle Autonomy*. Total: $515,968 (apportionment: 100%), 06/2021–05/2026, PI: Bradley, CNS-2047971

> **Description:** Build mathematical, real-time computing, and planning foundations for implementing co-regulation, a novel control strategy, in a resource-aware autopilot for Unmanned Aircraft Systems. A multi-agent, UAS-based rainforest monitoring will demonstrate the technology, and K-12, and adult educational activities will help increase the CPS workforce in Nebraska.

[G7] National Strategic Research Institute. *Fixed Wing VTOL Sensor Emplacement*. Total: $740,798 (apportionment: 33%), 06/2019–08/2021, PI: Detweiler, Co-PI: Bradley, Duncan, NSRI #U2-19-FA061

> **Description:** Enhance long-range deployment of UAS sensor emplacement system. Develop novel planning, control, and autonomy strategies for multi-flight missions. Adapt emplacement system to a VTOL fixed-wing aircraft. Multi-flight missions are widely applicable in multi-agent, or unattended multi-flight missions where human intervention is not feasible.

[G6] National Science Foundation. *REU Site: Undergraduate Research Opportunities in Unmanned Systems Foundations and Applications*. Total: $440,649 (apportionment: 33%), 06/2018–02/2021, PI: Duncan, Co-PI: Detweiler, Senior Personnel: Bradley, NSF-1757908

> **Description:** Attract, train, and retain the next generation of computer science, computer engineering, and robotics researchers by providing a Research Experience for Undergraduates. Mentor 3 undergraduate students per summer in aerospace-related projects. NOTE: all spending is on the collective group of students from one account.

[G5] National Strategic Research Institute. *Proposal to Support the United States Strategic Command: COTS Autonomous Tracking and Indicating Prototype*. Total: $677,489 (apportionment: 15%), 12/2017–12/2018, PI: Detweiler, Co-PI: Bradley, Duncan, NSRI #17-FU903-00

Description: Increase endurance of UAS sensor emplacement system. Investigate use of alternative fuel sources to enhance endurance. Develop control and autonomy for new augering system. Develop parachuting long-range deployment mechanism. Demonstrate new capabilities at White Sands Missile Range for stakeholders.

[G4] National Strategic Research Institute. *Proposal to Support the United States Strategic Command: Detection of Nuclear Threats Using Deployable Sensors*. Total: $469,293 (apportionment: 15%), 02/2017–12/2018, PI: Detweiler, Co-PI: Bradley, Duncan, NSRI #17-FU903-00

Description: Develop a UAS-based sensor emplacement mechanism. Design, build, test, and demonstrate new capability to stakeholders. This work enables autonomous emplacement of sensors in remote and difficult locations. The emplacement mechanism is encapsulated and easily adapted to other vehicles with capable payload bays. New control, planning, and autonomy algorithms address the new weight, manueverability, and flight time limitations of the system.

[G3] USDA National Institute of Food and Agriculture (National Robotics Initiative). *NRI: RUI: Collaborative Research: At the Water's Edge - Installation and Optimization of Robotic Sensing Systems*. Total: $949,716, UNL: $587,317 (apportionment: 50%), 09/2016–12/2020, PI (UNL): Detweiler, Co-PI (UNL): Bradley, PI (University of the Pacific): Basha, USDA-NIFA #2017-67021-25924

Description: Design, build, and test a multi-agent UAS for wetlands monitoring. Co-optimize sensor, communication, and computational resource usage to maximize data collection. Develop co-regulation strategies for multi-agent, cooperative control. Apply co-optimization and co-regulation to active learning for ground classification (e.g., mud, dirt, water) and sensor installation.

[G2] National Science Foundation. *NRI: Enabling UAS Fire Ignitions in Complex Firefighting Contexts*. Total: $1,003,270 (apportionment: 20%), 09/2016–08/2020, PI: Detweiler, Co-PI: Bradley, Duncan, Twidwell, NSF-1638099

Description: Development of a UAS for prescribed fire ignition. Develop co-regulation strategies for managing computational, user, and physical resources. Explore control software evolution and its impact on long-term, deployed UAS controllers. Conduct burn operations within Nebraska to expose fire managers to the system and solicit feedback for improvement.

[G1] NASA Nebraska Space Grant. *Strengthen NASA Collaborations for EPSCoR Proposal, NASA Nebraska Space Grant Mini-Grant*. Total: $1,410 (apportionment: 100%), PI: Bradley, 01/2016–02/2016

Description: Fund travel to NASA Ames to develop collaborations for submission of NASA EPSCoR proposal.

2.3 Research Patents and Awards

2.3.1 Patents

1. Bradley, Justin; Detweiler, Carrick; Duncan, Brittany; Hogberg, Jacob; Plowcha, Adam. NUTech Ventures, assignee. *Sensor Emplacement Using Unmanned Aircraft Systems*. Provisional patent #63/324,355. 2022.

Description: Systems and methods for sensor emplacement using unmanned aircraft systems (UASs). In some examples, a UAS includes a propulsion system and a sensor emplacement system including an auger and one or more motors. The UAS includes a control system configuring for controlling the propulsion system to land the UAS at a sensor emplacement site and controlling the one or more motors of the sensor emplacement system to drive the auger into soil at the sensor emplacement site. The control system is configured for measuring one or more augering parameters from the sensor emplacement system; and determining, using an autonomous system trained on soil data and augering data, one or more soil classification values for the soil based on the one or more augering parameters.

2.3.2 National and International Research Awards and Recognition

1. **American Institute of Aeronautics and Astronautics (AIAA) Associate Fellow** — Dec 2022
2. National Strategic Research Institute Fellow — Mar 2021
3. U.S. Air Force Summer Faculty Fellow — Summer 2021
   - Conduct research in "Single and Multi-Agent Navigation and Autonomy"
4. **NSF Early Career Development Award (CAREER)** — Jun 2021
   - Proposal "CAREER: Foundations for a Resource-Aware, Cyber-Physical Vehicle Autonomy"
5. U.S. Air Force Summer Faculty Fellow — Summer 2020
   - Conduct research in "Cooperative Control of Autonomous Systems in Uncertain Information Environments"
6. ICCPS Best Paper session (top 3 papers with highest reviews) — April 2020

2.3.3 Regional and Local Research Awards and Recognition

1. **Richard L. and Carol S. McNeel Associate Professor of Computing** — July 2023–present
2. UNL Research Leaders Program — Aug 2023–May 2024
   - The Research Leaders Program develops the next generation of research leaders among the faculty at the University of Nebraska-Lincoln. It is sponsored by the Office of Research and Economic Development and delivered in partnership with the Center for Professional and Executive Development in the College of Business. Up to 15 faculty are selected to participate in the program annually through a campus-wide nomination and application process.
3. UNL College of Engineering **Complete Engineer Fellow** — February 2022
4. UNL College of Engineering **Research Excellence Award** — October 2021
5. Selected to participate in 2015–2016 Research and Development Fellows Program

2.4 Other Research Accomplishments

2.4.1 Infrastructure Available to Community

- **Nebraska Intelligent MoBile Unmanned Systems (NIMBUS) Lab**: The NIMBUS Lab has the systems and facilities to develop and prototype hardware and algorithms on Unmanned Aircraft Systems (UASs) as well as other robot platforms. These facilities are highlighted on department tours and are used by a number of faculty and students (`http://nimbus.unl.edu`).
- **NIMBUS Robot Testing Facility**: Led the planning, fundraising, construction, and management of a $100\,\text{ft} \times 50\,\text{ft} \times 45\,\text{ft}$ outdoor netted facility (opened March 2020) on Nebraska's Innovation Campus for robotics testing.

3   TEACHING ACCOMPLISHMENTS (OTHER THAN CLASSROOM INSTRUCTION)

3.1   PhD Students

3.1.1   PhD Students Supervised

3. Chandima Fernando   Jan 2017–Dec 2022
   - Computer Science
   - Thesis: *Design And Deployment of Resource-Aware Distributed Multi-Agent Algorithms*
   - Co-advised with Dr. Carrick Detweiler
   - Currently Postdoctoral Fellow at Brookhaven National Laborator

2. Adam Plowcha   Jun 2016–Aug 2022
   - Computer Science
   - Thesis: *Autonomous, In-Ground, Sensor Emplacement Using Unmanned Aircraft Systems*
   - Co-advised with Dr. Carrick Detweiler
   - Currently Research Engineer at UNL NIMBUS Lab

1. Xinkai Zhang   July 2017–May 2021
   - Electrical Engineering
   - Thesis: *End-to-end Design of Resource-Aware, Co-Regulated Controllers For a Multicopter UAS*
   - Currently at Nvidia

3.1.2   PhD Students Currently in Progress

5. Haven Brown   Aug 2023–current
   - Computer Science
   - Expected graduation: May 2027

4. Ji Young Lee   May 2023–current
   - Computer Science
   - Expected graduation: May 2024

3. Daniel Rico   May 2023–current
   - Computer Engineering
   - Expected graduation: May 2025

2. Grant Phillips   Aug 2021–current
   - Computer Engineering
   - Expected graduation: May 2025

1. Balaji Balasubramaniam   Jan 2021–current
   - Co-advised with Dr. Hamid Bagheri
   - Computer Science
   - Expected graduation: May 2024

3.2   MS Students

3.2.1   MS Students (thesis option)

5. Nancy Pham   Sept 2018–May 2020
   - Computer Science
   - Currently at Microsoft

4. Marc Lussier   Oct 2017–Dec 2019
   - Co-advised with Dr. Carrick Detweiler
   - Mechanical Engineering
   - Currently at Aerovironment
3. Zhexiong Shang   Jul 2017–Apr 2019
   - Computer Science (PhD student in Architecture)
   - Currently postdoc at UNL (Architecture)
2. Balaji Balasubramaniam   Aug 2016–Dec 2018
   - Co-advised with Dr. Sebastian Elbaum
   - Computer Science
   - Currently faculty at Kansas State University
1. Seth Doebbeling   Nov 2015–Jun 2017
   - Mechanical Engineering
   - Currently at Garmin

3.2.2 *MS Students (thesis option) Currently in Progress*

4. John Helzer   Aug 2023–current
   - Mechanical Engineering
   - Expected graduation: 2025
3. Darryl York III   Aug 2023–current
   - Co-advised with Dr. Brittany Duncan
   - Computer Science
   - Expected graduation: 2025
2. Jahir Uddin   Aug 2023–current
   - Co-advised with Dr. Brittany Duncan
   - Computer Science
   - Expected graduation: 2025
1. Trent Wiens   Aug 2022–current
   - Mechanical Engineering
   - Expected graduation: 2024

3.3 Undergraduate Students

3.3.1 *Undergraduate Students Supervised in Independent Research Study*

12. Khushi Singh   Oct 2023–current
    - Funded by Bradley
11. Deva Pushkaran   Oct 2023–current
    - Funded by Bradley
10. Levi Busching   Jan 2023–current
    - Funded by Bradley/UCARE
9. Landen Fogle   Jan 2023–current
   - Funded by Bradley
8. Jack Cosson   Sep 2020–May 2021

- Funded by UNL First Year Research Experience (FYRE)

7. Derick Vasquez   Sep 2020–May 2021
   - Funded by UNL First Year Research Experience (FYRE)

6. Samuel Schneider   Nov 2020–Dec 2022
   - Advised in a Raikes Research Studio
   - Funded by UNL Raikes research award

5. David Besonen   May 2019–Dec 2020
   - Funded by UNL UCARE for Fall 2019 - Spring 2020
   - Honors thesis (expected Fall 2020)

4. Liam Kruse   Jan 2017–Aug 2020
   - Funded by Bradley/UCARE
   - First Raikes student to do a research-focused Design Studio
   - **2019 Barry Goldwater Scholarship recipient**
   - **2020 NSF GRFP award winner**
   - **PhD student, Stanford University**

3. Brady Klein   Jan 2018–Oct 2018
   - Funded by Bradley

2. Lucas Hall   Jan 2017–May 2018
   - Funded by Bradley

1. Shreya Rawal   May 2016–Dec 2016
   - Funded by UNL UCARE Award for Fall 2016 - Spring 2017

3.4   Visiting Scholars and Students

3.4.1   REU Site Scholars Advised

13.	Morgan (Tori) McCaskill	May 2023-Aug 2023
12.	Cole-Thomas Johnson	May 2023-Aug 2023
11.	Ojusvi Gudi	May 2023-Aug 2023
10.	Ben Adams	May 2023-Aug 2023
9.	Corbin Park	May 2022-Aug 2022
8.	Lucas Givens	May 2022-Aug 2022
7.	Brandon Ramos	May 2021-May 2022
6.	Bryan Melendez	May 2021-Aug 2021
5.	Mel Krusniak	May 2021-Aug 2021
4.	Santiago Giraldo	May 2021-Aug 2021
3.	Francisco De Jesus Quinga Socasi	June 2020 - July 2020
2.	Stefania Esquer	June 2020 - July 2020
1.	Andrew Brown	June 2019 - July 2019

3.5   Graduate Student Committee Membership

3.5.1   Doctoral Dissertation Committee

- Haley Olson, PhD Student, Mathematics, UNL (PhD Spring 2022)

- Mohammed Mosiur Rahman Lunar, Computer Science and Engineering, UNL (PhD in progress)
- Lizhi Qu, PhD Student, Electrical and Computer Engineering, UNL (PhD Spring 2019)

3.5.2 *Masters Thesis Committee*

- Daniel Rico, Computer Science, UNL (MS Spring 2021)
- Yuanjiu Hu, Computer Science, UNL (MS Spring 2020)
- Pedro Albuquerque, Computer Science, UNL (MS Fall 2019)
- Urja Acharya, Computer Science and Engineering, UNL (MS Spring 2018)
- Tyler Troyer, Biological Systems Engineering, UNL (MS Fall 2017)
- Willie Wells, Computer Science and Engineering, UNL (MS Fall 2016)

3.6 Teaching Awards and Recognition

3.6.1 *Regional, Local, and University Teaching Awards and Recognition*

- 2019-2020 UNL Certificate of Recognition for Contributions to Students

3.7 Other Teaching Accomplishments

4 TEACHING ACCOMPLISHMENTS (IN CLASSROOM)

4.1 Courses Developed

CSCE 936: Cyber-Physical Systems (formerly CSCE 990)

This course introduces students to the research, design, and analysis of cyber-physical systems - the tight integration of computing, control, and communication. Applications for CPS research are far reaching and span medical devices, smart buildings, vehicle systems, and mobile computing. The application domain for this course will be cyber-physical (aerospace) vehicle systems though techniques are more broadly applicable. Control theory, real-time systems, automata, guidance, and planning will be discussed.

CSCE 496/896: Real-Time Systems

This course introduces students to the design of real-time computing systems and corresponding theory. Real-time systems applications typically involve safety or mission critical systems where timing guarantees must be maintained. Real-time task design, dependability, communication, power and energy awareness, scheduling, and real-time control are some of the topics that will be covered. The course will be biased toward real-time system design including the interactions between the physical and real-time systems - dubbed "cyber-physical systems."

4.2 Courses Taught

Starting Fall 2020 UNL no longer uses a course evaluation scheme with "Instructor Effectiveness Rating." More extensive metrics are now used by students to evaluate courses.

- CSCE 451/851-700: Operating System Principles   Spring 2022
    61 students
- CSCE 936: Cyber-Physical Systems   Fall 2021
    14 students

- CSCE 451/851-700: Operating System Principles   Spring 2021
  71 students
- CSCE 451/851-001: Operating System Principles   Spring 2021
  18 students
- CSCE 990: Robotics Today   Summer 2020
  6 students
- CSCE 451/851-002: Operating System Principles   Spring 2020
  19 students
  Instructor Effectiveness Rating: mean: 4.26/5.00 std. dev. 0.88
- CSCE 451/851-001: Operating System Principles   Spring 2020
  61 students
  Instructor Effectiveness Rating: mean: 4.26/5.00 std. dev. 0.88
- CSCE 936: Cyber-Physical Systems   Fall 2019
  10 students (6 COMP, 3 MECH, 1 ABSE)
  Instructor Effectiveness Rating: mean: 4.5/5.00 std. dev. 0.67
- CSCE 451/851: Operating Systems   Spring 2019
  71 students
  Instructor Effectiveness Rating: mean: 4.01/5.00 std. dev. 1.11
- CSCE 936: Cyber-Physical Systems   Fall 2018
  11 students (7 COMP, 3 CENG, 1 ELEC)
  Instructor Effectiveness Rating: mean: 4.32/5.00 std. dev. 0.92
- CSCE 496/896: Real-Time Systems   Spring 2018
  11 students
  Instructor Effectiveness Rating: mean: 4.81/5.00 std. dev. 0.40
- CSCE 936: Cyber-Physical Systems   Fall 2017
  7 students (1 MECH, 1 ELEC, 1 CENG, 4 COMP)
  Instructor Effectiveness Rating: mean 4.64/5.00, std. dev 0.59
- CSCE 496/896: Real-Time Systems   Spring 2017
  13 students (3 MECH, 1 HUMS, 5 CENG, 3 COMP, 1 ELEC)
  Instructor Effectiveness Rating: mean 4.93/5.00 std. dev. 0.26
- CSCE 990: Cyber-Physical Systems   Fall 2016
  13 students (1 MECH, 1 HUMS, 2 CENG, 10 COMP)
  Instructor Effectiveness Rating: mean 4.49/5.00, std. dev 0.71
- CSCE 496/896: Real-Time Systems   Spring 2016
  14 students (1 MECH, 3 ELEC, 2 CENG, 7 COMP, 1 ABSE)
  Instructor Effectiveness Rating: mean 4.62/5.00, std. dev 0.63
- CSCE 990: Cyber-Physical Systems   Fall 2015
  9 students (3 MEAM, 1 ELEC, 3 ENGR, 2 COMP)
  Instructor Effectiveness Rating: mean 4.77/5.00, std. dev 0.50

4.3 Teaching Innovations

- Introduced new course: "Cyber-Physical Systems" CSCE 936 University of Nebraska, Fall 2015.
- Transitioned 4 research projects started in CSCE 990/936 (CPS) into publications.

- Developed labs to help students develop real-time systems programming skills using a small mobile robot (Plum Geek Ringo). These new labs were introduced Spring 2017 semester.

5 SERVICE ACCOMPLISHMENTS

5.1 Professional Service

5.1.1 Journal Paper Reviewer

1. IEEE Transactions on Control of Network Systems (2022)
2. IEEE Control Systems Letters (L-CSS) (2021)
3. IEEE Robotics and Automation Letters (2020, 2021, 2022, 2023)
4. IEEE Transactions on Aerospace and Electronic Systems (2020)
5. IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (2023)
6. ACM Transactions on Cyber-Physical Systems (2018)
7. AIAA Journal of Aerospace Information Systems (2014, 2015, 2020, 2021)
8. AIAA Journal of Guidance, Control, and Dynamics (2018, 2019)
9. IEEE Access (2017)
10. IEEE Computational Intelligence Magazine (2018)
11. IEEE Transactions on Wireless Communications (2016, 2017)
12. IMA Journal of Mathematical Control and Information (2019)
13. MDPI Sensors (2017)
14. MDPI Applied Sciences (2016)
15. Wiley Journal of Field Robotics (2018)

5.1.2 Conference Paper Reviewer

1. AIAA SciTech (2018, 2019, 2020, 2021, 2022, 2023, 2024)
2. AIAA SPACE Symposium (2018)
3. AIAA Infotech@Aerospace (2015)
4. IEEE International Symposium on Experimental Robotics (2023)
5. ACM REU Research in Networking and Systems (2023)
6. IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR) (2018)
7. IEEE American Control Conference (ACC) (2020)
8. IEEE Conference on Control Technology and Applications (CCTA) (2018, 2020, 2021, 2022)
9. IEEE/ACM International Conference on Cyber-Physical Systems (ICCPS) (2017, 2018)
10. IEEE International Conference on Robotics and Automation (ICRA) (2016, 2017, 2018, 2019, 2020, 2021)
11. IEEE International Conference on Intelligent Robots and Systems (IROS) (2016, 2017, 2020)
12. IEEE Conference on Decision and Control (CDC) (2019, 2020, 2022)
13. IFAC Cyber-Physical & Human Systems (2018)
14. Robotics Science and Systems (2020)
15. International Conference on Ubiquitous Robots (UR) (2020)

5.1.3 Leadership Positions in International and National Organizations

1. Intelligent Systems Technical Committee, AIAA, 2017–current
   - Chair elect, 2023
   - **Chair, Conference Planning Committee**, 2020, 2021

- Deputy Chair Conference Planning Committee, 2019
- **AIAA Autonomous Vehicle Task Force**, 2020
    - Group of 15 autonomous systems experts chosen throughout AIAA and charged with strategizing how AIAA can accelerate the certification of unmanned/autonomous vehicles

2. NSF CPS PI Meeting Organizing Committee, 2022
3. **Co-Chair** Competitions Committee, IEEE/ACM CPS-IoT Week, 2021
4. ACM/IEEE International Conference on Cyber-Physical Systems Technical Program Committee, 2017, 2018
5. IEEE Control Systems Society (CSS) Technology Conferences **Editorial Board**, 2020, 2021, 2022
6. IEEE Technical Committee On Aerospace Controls, 2019–current

5.1.4 *Memberships in Professional Organizations*

1. AIAA Associate Fellow, since 2022
2. AIAA Senior Member, since 2017-2022
3. IEEE Senior Member, since 2018
4. ACM Member, 2015–2018
5. Member, Eta Kappa Nu (HKN) Electrical Engineering Honor Society, since 2005

5.1.5 *Research Review Panels*

1. National Science Foundation Review Panel, 2016, 2017, 2018, 2019, 2021, 2023
2. United States Department of Agriculture (National Institute of Food and Agriculture) Review Panel, 2018
3. National Institute of Health Review Panel, 2017

5.2 University Service

5.3 College Service

5.3.1 *Leadership Positions on College Wide Committees*

1. Chair, Robotics Minor Committee, 2016–2022

5.3.2 *Membership Positions on College Wide Committees*

1. Robotics Minor Committee, 2015–current

5.4 Unit Service

5.4.1 *Leadership Positions on Unit Committees*

1. Chair, Graduate Recruiting and Outreach Committee, 2024
2. Chair, Personnel Committee, 2021–2022
3. Chair, Undergraduate Recruiting Committee, 2020–2022
4. Chair, Colloquium Series, 2019–2020
5. Chair, ACM/ICPC Programming Contest, Fall 2016–2019

5.4.2 Membership Positions on Unit Committees

1. Graduate Awards and Fellowships Committee, 2023
2. Faculty Search Committee, 2021, 2023
3. Undergraduate Recruiting Committee, 2020
4. Personnel Committee, 2020, 2021, 2022
5. International Collegiate Programming Contest, Fall 2019
6. Graduate Admissions Committee, 2019–2020
7. Department Chair search committee, 2019
8. Graduate Recruiting and Outreach Committee, 2015–2016, 2018, 2023
9. Graduate Computer Engineering Program Committee, 2018–current
10. Graduate Admissions Committee, 2015–2017

5.5 Other Service Accomplishments

- Helped conduct and organize week-long robotics course for Nebraska College Preparatory Academy, Lincoln, NE, June 2022
- Robotics summer camp course for Verizon's Innovative Learning Program at Central Community college, Columbus, NE, June 2022
- (2019, 2020) In conjunction with Verizon's Innovative Learning Program at Central Community College, conducted a "drone course" for middle school girls in Schuyler, NE.
- Organized National Robotics Week where public can come tour robotics labs at UNL, April 2016, April 2017, April 2018
- Judge for College of Engineering Graduate Poster Competition, University of Nebraska - Lincoln, Spring 2016
- Faculty Panelist, Ama-CSE-ing Race (Spring Recruitment), University of Nebraska, Lincoln, NE, USA, March, 12, 2016.
- Faculty Panelist, CSE Graduate Recruitment Day, University of Nebraska, Lincoln, NE, USA, (2015, 2016, 2021, 2022, 2023)
- Student travel grant reviewer, University of Nebraska - Lincoln, Spring 2016

5.6 Other Accomplishments

- 2022 Sponsor for Senior Design project – Husker STEM VR – an outreach/recruitment app being built for the Oculus Quest. Team built a virtual reality Oculus Quest app for UNL's School of Computing and College of Engineering to encourage STEM outreach.
- 2018-2019 Helped develop grading, curriculum for new type of research-focused Design Studio in Raikes School (Raikes Research Studio). Conducted and mentored first research Design Studio with Liam Kruse.
- 2017-2018 Sponsored a Senior Design project in which the team developed a testbed for a fleet of virtual and real CubeSats in which cooperative control algorithms could be tested.