

**RÉSUMÉ FOR DR. HENRY PERNICKA,
CURATORS' DISTINGUISHED TEACHING PROFESSOR OF
AEROSPACE ENGINEERING**

**Department of Mechanical and Aerospace Engineering
Missouri University of Science and Technology
331 Toomey Hall
400 West 13th Street
Rolla, MO 65409-0050
(573) 341-6749
pernicka@mst.edu**

ACADEMIC EDUCATION

Ph.D., May 1990, Aeronautical and Astronautical Engineering, Purdue University

Dissertation: “The Numerical Determination of Nominal Libration Point Trajectories and Development of a Station-Keeping Strategy” (168 typed pages). Research performed was in partial support of the SOHO, Wind, and ACE spacecraft missions.

Advisor: Dr. Kathleen C. Howell

M.S., December 1986, Aeronautical and Astronautical Engineering, Purdue University

Thesis: “The Numerical Determination of Lissajous Orbits in the Circular Restricted Three-Body Problem” (128 typed pages).

Advisor: Dr. Kathleen C. Howell

B.S., May 1984, Aeronautical and Astronautical Engineering, Purdue University

EMPLOYMENT HISTORY

September 2021 to Present:

Curators' Distinguished Teaching Professor of Aerospace Engineering, Missouri University of Science and Technology

September 2017 to September 2021:

Professor and Dean's Educator Scholar, Aerospace Engineering, Missouri University of Science and Technology

August 2001 to August 2017:

Associate Professor, Aerospace Engineering, Missouri University of Science and Technology

June 2004 to August 2004:

The Boeing Company

As a participant in the Boeing A.D. Welliver Summer Faculty Fellowship program, selected Boeing business units were toured.

August 1994 to July 2001:

Associate Professor, Aerospace Engineering, San José State University

August 1990 to August 1994:

Assistant Professor, Aerospace Engineering, San José State University

June-August 1991 and June-August 1992:

Member of the Technical Staff, Jet Propulsion Laboratory

As a participant in the NASA/ASEE Summer Faculty Fellowship Program, trajectory analysis was performed in support of the Mars Observer mission. Earth-to-Moon trajectories and a mission to return solar wind particles to the Earth were also studied.

August 1980 to July 1983:

Configuration Engineer, Wright-Patterson Air Force Base

(This position was in conjunction with the Purdue University Cooperative Education Program.)

PROFESSIONAL ACTIVITIES

1. Managing Editor for the archival journal *The Journal of the Astronautical Sciences*, 1999-2011.
2. Expert witness regarding the Blue Origin and Dynetics protests of NASA's SpaceX lunar lander award, May-August 2021.
3. Member of the American Astronautical Society's (AAS) Space Flight Mechanics committee, 2001-2006. The AAS is a national organization that promotes the astronautics field. The role on the committee is to assist with conference planning, report on the status of *The Journal of the Astronautical Sciences*, select various award recipients, and to attend to other miscellaneous activities relevant to the society. Membership in the committee is granted through a competitive selection process, in which new members are elected from a group of nominees by a vote of current members.
4. Member of the Genesis Mission Design and Navigation Peer Review panel, June 1, 1998. (Genesis was a spacecraft that collected samples of solar wind particles and recently returned them to the Utah desert on September 8, 2004.)
5. Member of the American Institute of Aeronautics and Astronautics, the American Astronautical Society, and the American Society of Engineering Education.
6. Reviewed 79 papers for archival journals, January 2002-present (~four per year).

HONORS

1. Named University of Missouri Curators' Distinguished Teaching Professor, September 2, 2021.
2. M-SAT research team placed first in AFRL's University Nanosatellite Program's Nanosat-8 competition, Jan. 2015.
3. Received Missouri University of Science and Technology College of Engineering and Computing Inaugural 2017-2019 Dean's Educator Scholar Title award, March 25, 2017.
4. President's Recognition Award, 2012, presented by the American Astronautical Society for service to the society.
5. Received Missouri University of Science and Technology Faculty Teaching Awards, December 2017, 2014 and 2011.
6. Received Missouri University of Science and Technology Faculty Service Awards, December 2019, 2014 and 2011.
7. Named Professor of the Semester by the Sigma Chi fraternity, Fall 2015 and Spring 2016.
8. Received Outstanding Student Advisor Award from the Missouri S&T Miner Alumni Association Board of Directors, October 2009.
9. Received Missouri S&T Academy of Mechanical and Aerospace Engineers Faculty Excellence Award, 2008/2009.
10. Received the ASEE Midwest Section Outstanding Teaching Award for 2006/2007.
11. Received University of Missouri-Rolla School of Engineering Innovative Teaching Award, November 2004.
12. Received University of Missouri-Rolla School of Engineering Teaching Excellence Awards, November 2004, 2005 and 2006.
13. Received Missouri University of Science and Technology Outstanding Teaching Awards, 2019-2020, 2017-2018, 2016-2017, 2015-2016, 2012-2013, 2011-2012, 2009-2010, 2008-2009, 2007-2008, 2006-2007, 2005-2006, 2004-2005 and 2003-2004.
14. Awarded a Boeing Welliver Summer Faculty Fellowship, Summer 2004. (Nine recipients were selected from an applicant pool of thirty-eight.)
15. Named the (first) American Institute of Aeronautics and Astronautics Foundation Professor, June 15, 2000.

16. Received the Outstanding Achievement Award from the American Institute of Aeronautics and Astronautics, Spring 1999.
17. Recipient of the National Aeronautics and Space Administration's Group Achievement Award for mission design work for the Mars Observer spacecraft, February 10, 1993.
18. Three years of graduate studies were funded by a fellowship under NASA's Graduate Student Researchers Program from June 1986 to May 1989.
19. Member of the Tau Beta Pi engineering honorary society.
20. Member of the Sigma Gamma Tau aero/astronautical engineering honorary society.

UNIVERSITY SERVICE

1. Formula Society of Automotive Engineers (FSAE) advisor, Fall 2002 to present.
2. Miners in Space advisor, Fall 2002 to 2015.
3. Member of the department Aerospace Technical Committee.
4. Member of the department Graduate Affairs Committee, 2011-2017 and 2006-2008.
5. Member of the department Assessment Oversight Committee.
6. Freshman Engineering Advisor, Fall 2007 to 2018 and Fall 2002 to Summer 2003.
7. Served on the Tuition and Residence Committee, AY 13-14.
8. Faculty advisor for the service fraternity Gamma Alpha Delta, AY 02/03.
9. Member (and chair three times) of numerous faculty search committees.

TEACHING SUMMARY

1. Missouri University of Science and Technology, Fall 2001 to present: Teaching courses at the junior, senior, and graduate level in aerospace engineering (astrodynamics and spacecraft design). An average student rating of 3.75/4.00 has been recorded to the question "Rate the overall teaching effectiveness of this instructor" over all classes taught at Missouri S&T the past five years (the Missouri S&T average for all faculty is 3.0/4.0).
2. Introduced four new courses at Missouri S&T: two are part of the senior design sequence in which students design and build a small spacecraft, the third is an advanced course in Astrodynamics targeted to graduate students, and the fourth introduces sophomore-level students to spacecraft design basics by launching student-built small payloads on a high-altitude balloon.
3. San José State University, 1990 to 2001: Taught courses from the freshman level through MS graduate student level. Required teaching load was four three-credit courses per semester. Courses in aerospace and mechanical engineering were taught. Subjects included dynamics,

astrodynamics, flight mechanics, vibrations, aerospace vehicle design, space systems engineering, and analytic and numeric analysis.

4. Purdue University, June-July 1990 and June-July 1989: Short courses (two-week) in Astronautical Engineering were taught to sixth-, seventh-, and eighth-grade students for summer programs for gifted young people.
5. Purdue University, Fall 1984: Graduate teaching assistant for sophomore level course in aerodynamics and graduate level course in spacecraft attitude dynamics.

TEACHING/RESEARCH ACHIEVEMENTS

1. Advisor and Principal Investigator for the M-SAT (Missouri University of Science and Technology Satellite) research team. As part of the Nanosat-4/6/7/8/9/10 programs funded by the U.S. Air Force, NASA, and AIAA, students designed and constructed microsatellites to compete with ~ten other universities for a launch into Earth orbit. Students actively collaborate with the Air Force, NASA, and industry members to craft and hone their designs. Multiple formal design reviews were held on and off campus. The team finished in second place in the Nanosat-7 round and was named the Most Improved Team in Nanosat-4. The team placed first in the Nanosat-8 competition in January 2015 (participation is by invitation only through a competitive proposal process). The Air Force is now actively seeking a launch opportunity to Earth orbit for the current M-SAT spacecraft. A new spacecraft (CubeSat) is also under development sponsored by NASA funding with a launch opportunity expected in early 2024.
2. Co-founded (with graduate student Yezad Anklesaria) the Missouri S&T High-Altitude Balloon program. The high-altitude balloon satellite program at Missouri S&T began in Summer 2013 as a summer camp experience for high school students and has since expanded to include a required sophomore-level course taken by all aerospace engineering undergraduate students. This program was initially developed to provide hands on experience in spacecraft design early in students' education. Dr. Jillian Schmidt joined this program in 2015, bringing additional experience to the team from her work with the University of Minnesota Stratospheric Ballooning Team as an undergraduate student. Since the inception of this program, Missouri S&T has conducted more than 20 successful balloon launches and recoveries. Missouri S&T is participating in the National Ballooning Eclipse Project from 2022- 2024 (through an invitation-only proposal process).
3. Primary advisor for a group of undergraduate students ("Miners in Space") that flew multiple times on NASA's "Vomit Comet" (AKA the Weightless Wonder) including June 2014, June 2013, June 2012, January 2009, July 2008, April 2007, July 2005, and July 2003. The Weightless Wonder is an aircraft modified by NASA that flies on parabolic arcs to create near weightless conditions that simulate space travel. The Miners in Space are among a group of students selected by NASA from a competitive proposal submission process. Their experiments successfully tested the administration of CPR during spaceflight, arc welding and a cold-gas propulsion system for microsatellites in the Weightless Wonder's near weightless environment.

4. Currently using the Space Systems Engineering lab in support of the overall astronautics curriculum through individual experiments that focus on the disciplines of spaceflight. A ground station has been completed that downlinks weather maps (visual and infrared) from NOAA spacecraft. This lab is also being used to design and fabricate small spacecraft to be placed into Earth orbit, both as a teaching exercise and for research purposes. A clean room is operational in the lab along with workbenches and various hand tools. Two senior-graduate level courses in spacecraft design were developed and offered that use this lab.
5. Graduate students Shannah Withrow-Maser and Bradyn Morton presented a paper entitled “On-Orbit CubeSat Performance Validation of a Multi-Mode Micropropulsion System” at the 31st Conference on Small Satellites in Logan, Utah, held August 7-10, 2017. Their oral presentation and paper earned Honorable Mention with each receiving a \$1,250 cash prize in a competition with five other university student papers invited to the conference in a refereed selection process.
6. Undergraduates Kevin King and Edward Nickel of The Miners in Space team placed first in the American Institute of Aeronautics and Astronautics (AIAA) SciTech 2014 International Student Conference held at the National Harbor, Maryland.
7. Undergraduate student Keith LeGrand presented a paper entitled “Initial Relative Orbit Determination Using Stereoscopic Imaging and Gaussian Mixture Models” at the 27th Conference on Small Satellite in Logan, Utah, held August 12-15, 2013. His oral presentation and paper earned second place and a \$7,500 cash prize in a competition with five other university student papers invited to the conference in a refereed selection process.
8. Undergraduate students Levi Malott and Pasha Palangpour presented a paper entitled “Small Spacecraft Software Modeling: A Petri Net-Based Approach” at the 27th Conference on Small Satellite in Logan, Utah, held August 12-15, 2013. Their oral presentation and paper earned third place and a \$5,000 cash prize in a competition with five other university student papers invited to the conference in a refereed selection process.
9. Graduate student Ryan Pahl and undergraduate student Christopher Tutza presented a paper entitled “Design, Test, and Validation of a Refrigerant-Based Cold-Gas Propulsion System for Small Satellites” at the 24st Conference on Small Satellite in Logan, Utah, held August 9-12, 2010. Their oral presentation and paper earned them first place and a \$10,000 cash prize in a competition with five other university student papers invited to the conference in a refereed selection process.
10. Graduate students Michael Dancer and Jason Searcy presented a paper entitled “Attitude/Orbit Determination and Control for the UMR SAT Mission” at the 21st Conference on Small Satellite in Logan, Utah, held August 13-16, 2007. Their oral presentation and paper earned them first place and a \$10,000 cash prize in a competition with five other university student papers invited to the conference in a refereed selection process.
11. Two students under my direct guidance were awarded first place in the AIAA (American Institute of Aeronautics and Astronautics) *national* competition, held in Reno, Nevada, January 1998. The award was for the paper entitled “Dynamic Modeling of Microsatellite Spartnik’s Attitude.” The same paper placed first at a regional AIAA Student Conference held in April 1997.

12. Two students under my direct guidance were awarded first place in the AIAA *national* competition, held in Reno, Nevada, January 1992. The award was for the paper entitled “Design of an Earth-Mars Communication Network Using Two Spacecraft in Halo Orbits Near Mars.” The same paper placed first at a regional AIAA Student Conference held in April 1991.
13. Received the NASA Group Achievement Award for “Trajectory Design” for Mars Observer Mission Design, 1993.

PUBLICATIONS AND PRESENTATIONS

Refereed Journals:

1. Kraft, K., Grant, H., Darling, J. and Pernicka, H., “Development, Verification, and Analysis of a Small Satellite Thrust Determination Filter,” *Journal of Spacecraft and Rockets*, Volume 59, No. 2, published online 22 March 2022, DOI: <https://doi.org/10.2514/1.A35147>.
2. Galchenko, P. and Pernicka, H., “Neural Network Attitude Control System Design for the Wallops Arc-Second Pointer,” (Engineering Note), *Journal of Guidance, Control, and Dynamics*, Volume 45, No. 7, published online 14 February 2022, <https://doi.org/10.2514/1.G006465>.
3. Davis, J., Pernicka, H. J., “Proximity Operations About and Identification of Non-Cooperative Resident Space Objects Using Stereo Imaging,” *Acta Astronautica*, Special Issue: Space Situational Awareness, DOI 10.1016/j.actaastro.2018.10.033.
4. LeGrand, K., DeMars, K., and Pernicka, H., “Bearings-Only Initial Relative Orbit Determination,” *Journal of Guidance, Control, and Dynamics*, Vol. 38, No. 9, September 2015, pp. 1699-1713, doi: <http://arc.aiaa.org/doi/abs/10.2514/1.G001003>.
5. Malott, L., Palangpour, P., Pernicka, H.J. and Chellappan, S. “Small Spacecraft Software Modeling: A Petri Net-Based Approach,” *AIAA Journal of Aerospace Information Systems*, Vol. 11, Special Section on Software Challenges in Aerospace (2014), pp. 679-690.
6. Harl, N. and Pernicka, H.J. “Low-Thrust Control of Lunar Orbits,” *The Journal of the Astronautical Sciences*, accepted July 2013.
7. Searcy, J. and Pernicka, H.J. “Magnetometer-Only Attitude Determination Using Novel Two-Step Kalman Filter Approach,” *Journal of Guidance, Control, and Dynamics*, Vol. 35, No. 6, November-December 2012.
8. Lee, Daero and Pernicka, H.J., “Integrated System for Autonomous Proximity Operations and Docking,” *International Journal of Aeronautical and Space Sciences*, Paper No. IJASS10-041, December 2011, pp. 43-56.
9. Lee, Daero and Pernicka, H.J., “Vision-Based Relative State Estimation Using the Unscented Kalman Filter,” *International Journal of Aeronautical and Space Sciences*, Paper No. IJASS10-032, December 2011, pp. 24-36.
10. Lee, Daero and Pernicka, H.J., “Optimal Control for Proximity Operations and Docking,” *International Journal of Aeronautical and Space Sciences*, Paper No. IJASS10-026, September 2010, pp. 179-193.

11. Harl, N. and Pernicka, H.J. "Low-Thrust Control of a Lunar Mapping Orbit," *Journal of Guidance, Control, and Dynamics*, Vol. 32, No. 3, May-June 2009.
12. Xin, M., Balakrishnan, S.N., Pernicka, H.J., "Libration Point Stationkeeping Using the θ -D Technique," *The Journal of the Astronautical Sciences*, Vol. 56, No. 2, April-June 2008.
13. Xin, M., Balakrishnan, S.N., Pernicka, H.J., "Position and Attitude Control of Deep-Space Spacecraft Formation Flying via Virtual Structure and Theta-D Technique," *Journal of Dynamic Systems, Measurement, and Control*, Vol. 129, Issue 5, September 2007, pp. 689-698.
14. Xin, M., Balakrishnan, S.N., Pernicka, H.J., "Multiple Spacecraft Formation Control with θ -D Method," *IET Control Theory and Applications*, March 2007, Volume 1, Issue 2, pp. 485-493.
15. Pernicka, H.J., Carlson, B.A., and Balakrishnan, S.N. "Spacecraft Formation Flight About Libration Points Using Impulsive Maneuvering," *Journal of Guidance, Control, and Dynamics*, Vol. 29, No. 5, September-October 2006, pp. 1122-1130.
16. Vignal, P. and Pernicka, H.J., "Low-Thrust Spacecraft Formation Keeping," *Journal of Spacecraft and Rockets*, Vol. 43, No. 2, March-April 2006, pp. 466-475.
17. Bruno, M.J. and Pernicka, H.J., "Tundra Constellation Design and Stationkeeping," *Journal of Spacecraft and Rockets*, Vol. 42, No. 5, September-October 2005, pp. 902-912.
18. Emma, B.P. and Pernicka, H.J., "An Algorithm for Autonomous Longitude and Eccentricity Control for Geostationary Spacecraft," *Journal of Guidance, Control, and Dynamics*, Vol. 26, No. 3, 2003, pp. 483-490.
19. Pernicka, H.J. and Coyle, D. J., "Orbit Determination at a Single Ground Station Using Range Rate Data," *The Journal of the Astronautical Sciences*, Vol. 49, No. 2, April-June 2001.
20. Pernicka, H.J., Scarberry, D.P., Marsh, S.M. and Sweetser, T.H., "A Search for Low ΔV Earth-To-Moon Trajectories," *The Journal of the Astronautical Sciences*, Vol. 43, No. 1, January-March 1995.
21. Howell, K.C. and Pernicka, H.J., "A Station-Keeping Method for Libration Point Trajectories," *Journal of Guidance, Control, and Dynamics*, January-February 1993, Vol. 16, No. 1, pp. 151-159.
22. Pernicka, H.J. and Howell, K.C., "Sun-Earth Libration Point Trajectories that Avoid the Solar Exclusion Zone," *The Journal of the Astronautical Sciences*, Vol. 38, No. 3, 1990, pp. 269-288.

23. Howell, K.C. and Pernicka, H.J., “Numerical Determination of Lissajous Trajectories in the Restricted Three-Body Problem,” *Celestial Mechanics*, Vol. 41, 1988, pp. 107-124.

Conference Papers/Presentations:

1. Jennings, D. and Pernicka, H. J., “Identifying Spacecraft Formation Trajectories at the Collinear Libration Points,” presented as paper AAS 23-148 at the 45th Annual AAS Guidance and Control Conference, Breckenridge, CO, February 3-8, 2023.
2. Jennings, D. and Pernicka, H., “Two-Level Targeter Convergence Study for Collinear Libration Point Spacecraft Formations,” *Proceedings of 2022 IEEE Aerospace Conference*, Volume 2022-March, Big Sky, Montana, 2022.
3. Jennings, D., Bruhn, N. and Pernicka, H., “Libration Point Spacecraft Formation Trajectory Design Using Genetic Algorithms,” *Proceedings of 45th AAS Guidance, Navigation, & Control Conference*, Breckenridge, CO, 2022.
4. Newberry, D. and Pernicka, H. J., “Invariant Extended Kalman Filter for Full-State Spacecraft Navigation,” presented as paper AAS 21-692 at the 2021 AAS/AIAA Astrodynamics Specialist Conference (virtual), Big Sky, MT, August 9-11, 2021.
5. Jennings, D. and Pernicka, H. “Identifying Relative Trajectory Geometries at Collinear Libration Points Using Genetic Algorithms,” presented at the IEEE Aerospace Conference (virtual), Yellowstone Conference Center, Big Sky, Montana, March 6-13, 2021.
6. Davis, J. and Pernicka, H., “The Application of Streaming Clustering to Spacecraft Identification and Tracking in Formation and Swarm Missions,” presented as paper AAS 21-381 at the 31st AAS/AIAA Space Flight Mechanics Meeting (virtual), February 1-3, 2021.
7. Schmidt, J., Davis, J., Anklesaria, Y., and Pernicka, H., “Virtual Space Camp: Explore Near Space from the Comfort of Your Home!,” presented at the Academic High Altitude Conference (virtual), September 18-19, 2020.
8. Galchenko, P. and Pernicka, H. J., “Pointing System Design for the Coronal Diagnostic Experiment (CODEX) Using a Modified State Observer and a Neural Network Controller,” presented as paper AAS 20-716 at the 2020 AAS/AIAA Astrodynamics Specialist Conference (virtual), Lake Tahoe, CA, August 9-12, 2020.
9. Jennings, D. and Pernicka, H. J., “On-Board Relative Guidance for Swarm Missions Near Collinear Libration Points,” presented as paper AAS 20-708 at the 2020 AAS/AIAA Astrodynamics Specialist Conference (virtual), Lake Tahoe, CA, August 9-12, 2020.
10. Craft, K., Hecht, G. and Pernicka, H. J., “Development and Verification of a Precise Orbit Determination Filter for the APEX CubeSat Mission,” presented as paper SSC20-VII-05 at

the 34th Conference on Small Satellites (virtual), Logan, Utah, August 1-6, 2020. (Awarded second place in the student paper competition session)

11. Jennings, D. and Pernicka, H. “Numerical Determination of Natural Spacecraft Formations Near the Collinear Libration Points,” presented at the IEEE Aerospace Conference, Yellowstone Conference Center, Big Sky, Montana, March 7-14, 2020.
12. Davis, J. and Pernicka, H. “Development of Cooperative Vision-Based Navigation Techniques Using Neural Networks,” presented at the IEEE Aerospace Conference, Yellowstone Conference Center, Big Sky, Montana, March 7-14, 2020.
13. Craft, K., Darling, J. and Pernicka, H. “Performance Determination of a Multi-Mode Thruster using GPS and Star Tracker Data,” presented at the IEEE Aerospace Conference, Yellowstone Conference Center, Big Sky, Montana, March 7-14, 2020 (paper received Track Best Paper award).
14. Davis, J. and Pernicka, H. “Spacecraft Identification Using Neural Networks for Constellation, Formation, and Swarm Missions,” presented at the 2020 AIAA SciTech Forum, Orlando, Florida, January 6-10, 2020.
15. Schmidt, J., Meeks, W. and Pernicka, H.J., “Evaluating the Impact of an Expanded Sophomore Design Curriculum for Aerospace Engineering Students,” presented as a poster at the 2019 American Society for Engineering Education Midwest Section Conference, Wichita State University, September 15-17, 2019.
16. Reynolds, A., Hosder, S. and Pernicka, H.J., “Application of a Six Degrees-of-Freedom Drag Model for Small Satellite Mission Development” presented as paper SSC19-VIII-01 at the 33rd Conference on Small Satellites, Logan, Utah, August 3-8, 2019.
17. Davis, J., Reynolds, A., Anklesaria, Y., Schmidt, J. and Pernicka, H. J., “Development of a High-Altitude Balloon CubeSat Platform for Small Satellite Education and Research,” presented as poster SSC19-WP1-03 at the 33rd Conference on Small Satellites, Logan, Utah, August 3-8, 2019.
18. Reynolds, A. and Pernicka, H. J., “Design and Verification of a Stereoscopic Imager for Use in Spacecraft Close Proximity Operations,” presented as paper AAS 19-015 at the 42nd Annual AAS Guidance and Control Conference, Breckenridge, CO, January 31 – February 6, 2019.
19. Newberry, D., Mayhall, B., Western, D., Jennings, D., and Pernicka, H. J., “Application of Predictive Control for Desired Attitude Stabilization with Magnetic Actuators,” presented as paper AAS 19-015 at the 42nd Annual AAS Guidance and Control Conference, Breckenridge, CO, January 31 – February 6, 2019.

20. Galchenko, P. and Pernicka, H. J., "Precision Control of Microsatellite Swarms Using Plasmonic Force Propulsion," presented as paper AAS 18-472 at the 2018 AAS/AIAA Astrodynamics Specialist Conference, Snowbird, UT, August 19-23, 2018.
21. Jennings, D., Davis, J., Galchenko, P., and Pernicka, H. J., "Validation of a GNC Algorithm Using a Stereoscopic Imaging Sensor to Conduct Close Proximity Operations," presented as paper AAS 18-015 at the 41st Annual AAS Guidance and Control Conference, Breckenridge, CO, February 2-7, 2018.
22. Davis, J. and Pernicka, H. J., "Proximity Operations About and Identification of Noncooperative Resident Space Objects Using Stereo Imaging," presented at the 1st IAA Conference on Space Situational Awareness (ICSSA), Orlando, FL., November 12-15, 2017.
23. Davis, J., Galchenko, P., Jennings, D., and Pernicka, H. J., "Development and Validation of a GNC Algorithm Using a Stereoscopic Imaging Sensor in Close Proximity Operations," presented as paper AAS 17-841 at the AAS/AIAA Astrodynamics Specialists Conference, Stevenson, WA, August 20-24, 2017.
24. Galchenko, P. and Pernicka, H. J., "Precision Formation Flying and Spacecraft Pointing Using Plasmonic Force Propulsion," presented as paper AAS 17-831 at the AAS/AIAA Astrodynamics Specialists Conference, Stevenson, WA, August 20-24, 2017.
25. Morton, Bradyn, Withrow-Maser, Shannah, and Pernicka, Henry, "On-Orbit CubeSat Performance Validation of a Multi-Mode Micropropulsion System," presented as paper SSC17-VIII-4 at the 31st Conference on Small Satellites, Logan, Utah, August 7-10, 2017.
26. Winter, T., Coleman, B., and Pernicka, H., "Development of a Multidisciplinary Design Analysis and Optimization Toolset for Integrated Spacecraft Subsystem Models," presented as paper AIAA-2016-3363 at the 17th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, Washington D.C., June 13-17, 2016.
27. Darling, Jacob E., Pernicka, H.J., et. al, "Development and Flight of a Stereoscopic Imager for Use in Spacecraft Close Proximity Operations," presented as paper AAS 16-085 at the 39th Annual AAS Guidance and Control Conference, Breckenridge, Colorado, February 5-10, 2016.
28. LeGrand, K. A., DeMars, K. J., and Pernicka, H. J., "Initial Relative Orbit Determination Using Multiple LOS Measurements and Gaussian Mixture Models," Missouri S&T Undergraduate Research Conference, Rolla, Missouri, April 16, 2014.
29. LeGrand, K., DeMars, K., and Pernicka, H., "Probabilistic Initial Relative Orbit Determination," Small Satellites Systems and Services Symposium (The 4S Symposium), Porto Petro, Majorca, Spain, May 2014.
30. Darling, J., DeMars, K., McCabe, J., and Pernicka, H., "Linear and Unscented Covariance Analysis for Spacecraft Close Proximity Relative Navigation," presented as paper AAS 14-

257 at the 24th AAS/AIAA Space Flight Mechanics Meeting, Santa Fe, New Mexico, January 26-30, 2014.

31. LeGrand, K., DeMars, K., and Pernicka, H., “Initial Relative Orbit Determination Using Multiple LOS Measurements and Gaussian Mixture Models,” presented as paper AAS 14-292 at the 24th AAS/AIAA Space Flight Mechanics Meeting, Santa Fe, New Mexico, January 26-30, 2014.
32. LeGrand, K. and Pernicka, H.J., “Initial Relative Orbit Determination Using Stereoscopic Imaging and Gaussian Mixture Models,” presented as paper SSC13-VIII-6 at the 27th Annual AIAA/USU Conference on Small Satellites, Logan, Utah, August 10-15, 2013.
33. Malott, L., Palangpour, P., and Pernicka, H.J., “Small Spacecraft Software Modeling: A Petri Net-Based Approach,” presented as paper SSC13-VIII-6 at the 27th Annual AIAA/USU Conference on Small Satellites, Logan, Utah, August 10-15, 2013.
34. McCall, P., Gildo, T., Darling, J., LeGrand, K., Liu, C. and Pernicka, H., “Many-Core Computing for Space-based Stereoscopic Imaging,” presented as paper 2808 3 in Session: 7.03 Multi- and Many-Core Computing in Space: Hardware and Software at the 2013 IEEE Aerospace Conference, Big Sky, Montana, March 2-9, 2013.
35. Darling, J., LeGrand, K., Pernicka, H., and Lovell, T.A., “Close Proximity Operations Using Stereoscopic Imaging,” presented as paper AAS 13-415 at the 23rd AAS/AIAA Space Flight Mechanics Meeting, Lihue, Hawaii, February 10-14, 2013.
36. Mahajan, B., Pernicka, H., and Darling, J., “Orbit Determination of an Uncooperative RSO Using a Stereo Vision-Based Sensor,” presented as paper AAS 13-434 at the 23rd AAS/AIAA Space Flight Mechanics Meeting, Lihue, Hawaii, February 10-14, 2013.
37. Mahajan, B. and Pernicka, H.J., “Halo Orbits Near Small Bodies in the Elliptic Restricted Problem,” presented as paper AIAA 12-4876 at the AIAA/AAS Astrodynamics Specialists Conference, Minneapolis, Minnesota, August 13-16, 2012.
38. Harl, N. and Pernicka, H.J., “Low Thrust Control of Lunar Orbits,” presented as paper AAS 11-562 at the Astrodynamics Specialists Conference, Girdwood, Alaska, July 31-August 4, 2011.
39. Searcy, J. and Pernicka, H.J., “Magnetometer-Only Attitude Determination Using Two-Step Kalman Filter,” presented as paper AAS 11-572 at the Astrodynamics Specialists Conference, Girdwood, Alaska, July 31-August 4, 2011.
40. Meub, James and Pernicka, H., “Spacecraft Proximity Operations Using Continuous Low Thrust,” presented as paper AAS 11-139 at the AAS/AIAA Spaceflight Mechanics Meeting, New Orleans, Louisiana, February 13-17, 2011.

41. Pahl, R., Tutza, C., Pernicka, H., and Rovey, J., "Design, Test, and Validation of a Refrigerant-Based Cold-Gas Propulsion System for Small Satellites," presented as paper SSC10-VIII-6 at the 24th Annual AIAA/USU Conference on Small Satellites, Logan, Utah, August 9-12, 2010.
42. Lee, D. and Pernicka, H., "Improvement of Vision-Based Relative Estimation Using Multiple Vector Observations," presented as paper AAS 09-118 at the AAS/AIAA Spaceflight Mechanics Meeting, Savannah, Georgia, February 9-12, 2009.
43. Lee, D. and Pernicka, H., "Vision-Based Relative State Estimation Using the Unscented Kalman Filter," presented as paper AAS 09-166 at the AAS/AIAA Spaceflight Mechanics Meeting, Savannah, Georgia, February 9-12, 2009.
44. Harl, N. and Pernicka, H., "Low-Thrust Control of Lunar Orbits," presented as paper AAS 09-150 at the AAS/AIAA Spaceflight Mechanics Meeting, Savannah, Georgia, February 9-12, 2009.
45. Harl, N. and Pernicka, H., "Low-Thrust Control of a Lunar Mapping Orbit," presented at the 20th International Symposium on Space Flight Dynamics, Annapolis, Maryland, September 28, 2007.
46. Aggarwal, S., Pernicka, H., and Balakrishnan, S.N., "Optimal Control of a Sun-Synchronous Lunar Orbiter," presented as paper AIAA-2007-6845 at the AIAA Guidance, Navigation and Control Conference and Exhibit, Hilton Head, South Carolina, August 20-23, 2007.
47. Dancer, M.W., Searcy, J.D., and Pernicka, H., "Orbit/Attitude Determination and Control for the UMR SAT Mission," presented as paper SSC07-IX-6 at the 21st Annual AIAA/USU Conference on Small Satellites, Logan, Utah, August 13-16, 2007.
48. Seubert, C., Pernicka, H., et al., "Feasibility of Developing a Refrigerant-Based Propulsion System for Small Spacecraft," presented as paper SSC07-III-4 at the 21st Annual AIAA/USU Conference on Small Satellites, Logan, Utah, August 13-16, 2007.
49. Seubert, C., Pernicka, H., and Norgren, C., "Refrigerant-Based Propulsion System for Small Spacecraft," presented as paper AIAA-2007-5131 at the 43rd AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit, Cincinnati, Ohio, July 8-11, 2007.
50. Dancer, M.W., Pernicka, H.J., Searcy, J.D., and Walker, D.R., "Attitude Determination and Control System for the University of Missouri-Rolla Satellite Mission," presented as paper AAS 07-044 at the 30th Annual AAS Guidance and Control Conference, Breckenridge, Colorado, February 3-7, 2007.
51. Dancer, M., Searcy, J., Pernicka, H., and Balakrishnan, S.N., "MR SAT Orbit Determination Using the Θ -D Filter," presented as paper AIAA-2006-6401 at the AIAA/AAS Astrodynamics Specialist Conference and Exhibit, Keystone, Colorado, August 21-24, 2006.

52. Tolbert, D.R. and Pernicka, H.J., "Orbit Optimization for Regenerative Aerobraking at Mars," presented as paper AAS 05-355 at the Astrodynamics Specialists Conference, South Lake Tahoe, California, August 7-11, 2005.
53. Carlson, B.A., Pernicka, H.J., and Balakrishnan, "Discrete Maneuver Formationkeeping at Libration Points L_1 and L_2 " presented as paper AAS 05-194 at the AAS/AIAA Spaceflight Mechanics Meeting, Copper, Colorado, January 23-27 2005.
54. Xin, M., Balakrishnan, S.N., and Pernicka, H.J., "Multiple Spacecraft Formation Control with $\theta-D$ Method," presented at the 16th IFAC World Congress, Prague, Czech Republic, July 4-8, 2005.
55. Xin, M., Balakrishnan, S.N., and Pernicka, H. "Deep-Space Spacecraft Formation Flying Using $\theta-D$ Control," presented at the AIAA Guidance, Navigation, and Control Conference as paper AIAA 2004-4784, Providence, Rhode Island, August 16-19, 2004.
56. Pernicka, H.J., Carlson, B.A., and Balakrishnan, S.N., "Spacecraft Formation Flight about Libration Points," presented at the AIAA/AAS Astrodynamics Specialist Conference as paper AIAA 2004-4737, Providence, Rhode Island, August 16-19, 2004.
57. Pernicka, H.J., Dancer, M., Abrudan, A. and Harington, J., "Simulation of the Dynamics of a Short Tethered Satellite System," presented at the AIAA/AAS Astrodynamics Specialist Conference as paper AIAA 2004-5311, Providence, Rhode Island, August 16-19, 2004.
58. Xin, M., Dancer, M. W., Balakrishnan, S.N., and Pernicka, H.J. "Stationkeeping of an L_2 Libration Point Satellite with $\theta-D$ Technique," presented at the American Control Conference, Boston, MA, June 30-July 2, 2004. (1031 submittals out of 1796 were accepted).
59. Vignal, P. and Pernicka, H.J., "Close Formation Spacecraft Formation Keeping," presented as paper AAS 04-296 at the 14th AAS/AIAA Space Flight Mechanics Meeting, Maui, Hawaii, February 8-12, 2004.
60. Bruno, M.J. and Pernicka, H.J., "Tundra Constellation Mission Design and Stationkeeping," presented at the AAS/AIAA Astrodynamics Specialist Conference, Big Sky, Montana, August 3-7, 2003.
61. Bruno, M.J. and Pernicka, H.J., "Mission Design Considerations for the Tundra Constellation," presented at the AIAA/AAS Astrodynamics Specialist Conference, Monterey, California, August 5-8, 2002.
62. Emma, B.P. and Pernicka, H.J., "An Algorithm for Autonomous Longitude and Eccentricity Control for Geostationary Spacecraft," presented as paper AAS 02-150 at the AAS/AIAA Space Flight Mechanics Meeting, San Antonio, Texas, January 27-30, 2002; published in proceedings *Advances in the Astronautical Sciences*, Vol. 112, Part 1, pp. 627-646.

63. Pernicka, H.J. and Coyle, D. J., "Orbit Determination at a Single Ground Station Using Range Rate Data," presented as paper AAS 00-112 at the AAS/AIAA Space Flight Mechanics Meeting, Clearwater, Florida, January 23-26, 2000; published in proceedings *Advances in the Astronautical Sciences*, Vol. 105, Part 2, pp. 321-336.
64. Becker, T.A. and Pernicka, H.J., "A Study of Resonance Effects on Polar Orbits About Ellipsoidal Shaped Bodies," presented as paper AAS 99-162 at the AAS/AIAA Space Flight Mechanics Meeting, Breckenridge, Colorado, February 7-10, 1999; published in proceedings *Advances in the Astronautical Sciences*, Vol. 102, Part 1, pp. 911-930.
65. Lin, J, Soriano, F., Schoenman, M, and Pernicka, H., "Project Spartnik: Microsatellite Design, Construction, Testing, and Operation by Undergraduate Students," presented at the 12th Annual AIAA/Utah State University Conference on Small Satellites, September 2, 1998.
66. Pernicka, H.J. and Becker, T.A., "A Numerical Study of Frozen Polar Orbits About Ellipsoidal Shaped Bodies," presented as paper AAS 97-619 at the AAS/AIAA Space Flight Mechanics Meeting, Sun Valley, Idaho, August 4-7, 1997; published in proceedings *Advances in the Astronautical Sciences*, Vol. 97, Part 1, pp. 297-312.
67. Menges, B., Guadamos, C. and Pernicka, H.J. "Dynamic Modeling of Microsatellite Spartnik's Attitude," presented at the 36th AIAA Aerospace Sciences Meeting & Exhibit, Reno, Nevada, January 12-15, 1998. Also presented at the 11th Annual AIAA/Utah State University Conference on Small Satellites, September 1997.
68. Pernicka, H.J. and Scarberry, D.P., "Low ΔV Earth-to-Moon Trajectories," presented as paper AAS 95-400 at the AIAA/AAS Astrodynamics Specialist Conference, Halifax, Nova Scotia, Canada, August 14-17, 1995; published in proceedings *Advances in the Astronautical Sciences*, Vol. 90, Part 2, pp. 1639-1653.
69. Pernicka, H.J., Scarberry, D.P., Marsh, S.M. and Sweetser, T.H., "A Search for Low ΔV Earth-To-Moon Trajectories," presented at the AAS/AIAA Astrodynamics Conference, Scottsdale, Arizona, August 1-3, 1994; published in proceedings pp. 530-537.
70. Pernicka, H.J. and Hunter, J.M., "Space Systems Curriculum Development at San José State University," presented at the Annual Meeting of the American Society of Engineering Education, University of Illinois at Urbana-Champaign, June 20-24, 1993.
71. Pernicka, H.J., Sweetser, T.H. and Roncoli, R.B., "A Strategy to Rotate the Mars Observer Orbit Node Line to Advance the Mapping Schedule," presented at the AAS/AIAA Spaceflight Mechanics Meeting, Pasadena, California, February 22-24, 1993.
72. Pernicka, H.J., Henry, D. and Chan, M., "Use of Halo Orbits to Provide a Communication Link Between Earth and Mars," AIAA/AAS paper 92-4585 presented at the AIAA/AAS Astrodynamics Conference, Hilton Head South Carolina, August 10-12, 1992; published in proceedings pp. 445-455.

73. Howell, K.C. and Pernicka, H.J., "A Station-Keeping Method for Libration Point Trajectories," AIAA/AAS Paper 90-2958, August 1990, presented at the AIAA/AAS Astrodynamics Conference, Portland, Oregon, August 20-22, 1990.
74. Pernicka, H.J. and Howell, K.C., "Numerical Determination of Libration Point Trajectories with Out-of-Plane Maneuvers to Avoid the Solar Exclusion Zone," *Advances in the Astronautical Sciences*, Vol. 69, 1989, pp. 359-374, presented at the AAS/GSFC International Symposium on Orbital Mechanics and Mission Design, Greenbelt, Maryland, April 24-27, 1989.
75. Howell, K.C. and Pernicka, H.J., "Numerical Determination of Lissajous Trajectories in the Restricted Three-Body Problem," AIAA/AAS Paper 86-2002 presented at the AIAA/AAS Astrodynamics Conference, Williamsburg, Virginia, August 18-20, 1986.

Invited Lectures:

1. Invited as a panelist for “Effective Teaching: Tips from Award-Winning Instructors,” 2022 Focus on Teaching and Technology Conference (virtual), September 29, 2022.
2. Invited to present “Building Microsatellites for the Future,” as part of the Missouri 2021 Bicentennial Alliance lecture series hosted by Missouri S&T., October 5, 2021.
3. Invited to present “SmallSat Swarm Proximity Operations: Herding Cats Might be Easier!” to the Missouri-NASA Space Grant Midwest Region “Short Talks,” November 14, 2019.
4. Presented “Tips on Defending your Thesis/Dissertation” at the Missouri University of Science and Technology Thesis & Dissertation Writing Camp, October 2, 2019.
5. Presented “So We Decided to Build a Satellite... Who Knew How Much Fun This Would Be?!” as the keynote speaker at the 27th Annual Spring Meeting of the NASA-Missouri Space Grant Consortium, April 20th 2018.
6. Invited to present Missouri S&T Satellite team research at Sandia National Laboratory, Albuquerque, New Mexico, January 19, 2016.
7. Invited to present “Design, Fabrication, and Test of a Microsatellite” at Truman State University, October 6, 2010.
8. Invited to participate on the panel discussion “Design/Build/Fly: Student Satellites” at the Great Midwestern Region Space Grant Meeting, University of Minnesota, Minneapolis, Minnesota, September 16, 2010.
9. Invited to present “Libration Point Constellation Design” at the Georgia Institute of Technology, February 10, 2010.
10. Invited to present “MR SAT: Spacecraft Design and Construction at the University of Missouri-Rolla” at Southwest Missouri State University, October 25, 2004.
11. Invited to present “Project MR SAT” at the UMR ASME meeting, December 3, 2003.
12. Invited to present “University-Level Small Satellite Design and Construction,” at the University of Missouri-Columbia, February 28, 2002.
13. Invited to present “Project Spartnik” at Lockheed Martin, Sunnyvale, California, June 14, 2000.
14. Invited to present “Finite Element Analysis for Predicting Launch Loads” with graduate student Emily Fowler at the Space Systems/Loral Lunchtime Engineering Seminar Series, Palo Alto, California, May 24, 2000.

15. Invited to present “Project Spartnik” at the Space Systems/Loral Lunchtime Engineering Seminar Series, Palo Alto, California, May 20, 1998.
16. Invited to participate on a panel discussion, “Special Session on University Satellites,” at the AIAA/AAS Astrodynamics Specialists Conference, San Diego, CA, July 30, 1996.
17. Invited to present “Libration Points and Their Orbits: What are They and What Are They Good For?” at the Lockheed Palo Alto Colloquium, Palo Alto, California, October 21, 1993.
18. Invited to present “Some Current and Future Applications of Libration Point Orbits” at the Space Systems/Loral Lunchtime Engineering Seminar Series, Palo Alto, California, April 1, 1992.

GRANTS RECEIVED AT MISSOURI S&T, 2001-Present

1. PI on: Utah State University Research Foundation (via Air Force Office of Scientific Research), “Exploring the Feasibility of University-Class Cislunar CubeSats,” \$60,000, May 1, 2023 – August 25, 2023.
2. Co-PI on “Nationwide Eclipse Ballooning Project (NEBP),” December 2022 (funding amount TBD).
3. Co-PI at 33% credit on: Air Force Office of Scientific Research, DURIP: “Acquisition of Thermal-Cycling and Plasma/Diagnostic Systems for a Large Vacuum Facility” \$242,172 September 30, 2020 – September 29, 2021.
4. Co-PI at 30% credit on: Utah State University Research Foundation (via Air Force Office of Scientific Research), “Multi-Mode MicroPropulsion CubeSat Technology Demonstration Mission,” \$220,000, December 16, 2015 - May 14, 2018.
5. Co-PI at 22% credit on: NASA, “Experimental Demonstration and System Analysis for Plasmonic Force Propulsion,” \$500,000, July 1, 2016 to June 30, 2018.
6. PI at 35% credit on: NASA, “Use of Multi-Mode Propulsion to Expand CubeSat Mission Capabilities, \$199,911, Fall 2016 to May 8, 2018.
7. Co-PI w/Joshua Rovey: "Multi-mode Rocket for CubeSats," the University of Missouri System Interdisciplinary Intercampus Research Program. The total amount awarded for the project is \$100,000 (\$50K to S&T and \$50K to Mizzou Co-PIs). Period of performance is from August 1, 2015 to July 31, 2016.
8. PI at 100% credit on: M4 Engineering: “Multi-disciplinary Analysis and Optimization of Integrated Spacecraft Systems Models,” \$37,500, June 17, 2015 to June 17, 2016.
9. Co-PI at 7% credit on: Department of Education, “GAANN: Doctoral Research and Training in Mechatronics,” \$295,278, September 1, 2015 to August 31, 2016.
10. PI at 80% credit on: Air Force Office of Scientific Research, “Development and Validation of a Stereoscopic Imager and a Micropropulsion System for Use in Spacecraft Close Proximity Operations,” \$110,000, September 15, 2013-September 14, 2015.
11. Co-PI at 20% credit on: NASA-EPSCoR RID Missouri, “Common Green Propellant for Both Chemical and Electropray Micro-thrusters,” \$23,000, September 1, 2013-August 31, 2014 (Joshua Rovey PI).
12. PI at 100% credit on: NASA-EPSCoR Missouri, “Expanded Collaboration of the M-SAT Team with JPL, AFRL, and NSF,” \$25,000, February 2013-April 2014.

13. PI at 80% credit on: Air Force Office of Scientific Research, “Design, Fabrication, and Test of Spacecraft Conducting Proximity Operations,” \$110,000, January 2011-January 2013.
14. Co-PI at 20% credit on: Air Force Office of Scientific Research, “Vacuum Facility Acquisition,” \$118,947, June 1, 2009-May 31, 2010.
15. PI at 100% credit on: Air Force Office of Scientific Research, “Design, Integration, and Flight Test of a Pair of Autonomous Spacecraft Flying in Formation,” \$110,000, January 2009-January 2011.
16. PI at 100% credit on: NASA, “Evaluation of Trajectory Optimization Methods and their Software Implementations,” \$30,000, August 1, 2008 – July 31, 2009.
17. PI at 100% credit on: \$20,000 grant from The Boeing Company in support of the UMR SAT project, October 2006 – September 2007.
18. PI at 100% credit on: Air Force Office of Scientific Research, “Design, Fabrication, and Test of a Formation of Two Satellites,” \$110,000, May 2005 – April 2007.
19. PI at 100% credit on: \$25,000 grant from The Boeing Company in support of the MR SAT project, June 2004 – June 2005.
20. PI at 100% credit on: NASA, “Modeling and Optimization of Distributed Space System Formations near Libration Points,” \$72,000, August 2003 – August 2006. (Three-year grant at \$24,000/year.)
21. Co-PI at 51% credit on: NASA Goddard Space Flight Center, “Libration Point Formation Control,” \$180,000, May 1, 2003 – April 30, 2006. (Three-year grant at \$60,000/year.)
22. PI at 100% credit on: NASA Goddard Space Flight Center, “Design and Test of a Tethered Pair of Satellites: Equipment Requirements,” \$19,580, May 7, 2002. Funds expended September 2002-November 2002.
23. PI at 100% credit on: University of Missouri Research Board, “Hands-On Satellite Design, Manufacture, and Operation,” \$21,000, December 5, 2001. Funds expended June 2002 to December 2003.