

David Barnhart

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Professional Experience

Director/Research Professor Appointment *Department of Astronautical Engineering and Information Sciences Institute, University of Southern CA, Los Angeles*

Director, Space Engineering Research Center at USC and Director Space Systems and Technology Division at ISI.

(Since 2014)

CEO/Co-Founder *Arkisys Inc., Los Angeles, CA*

CEO of commercial space startup for on orbit construction and aggregation. **(Since 2014)**

Program Manager *Defense Advanced Research Projects Agency (DARPA), Arlington VA*

Space innovation architect for small satellites, satellite robotics and inspiration based engineering technology. Created and currently lead three major space programs critical to US national capability with emphasis in on-orbit assembly, Geo-robotics, and low-cost satellite manufacturing. **(Since 2010)**

Research Professor Appointment *Department of Astronautical Engineering, University of Southern CA, Los Angeles*

Co-founder of new research center, (Space Engineering Research Center), and creation of new undergraduate/graduate classes directing hands-on aerospace systems projects. Created 2nd largest national level test facility for distributed satellite operations. Pioneered innovative "teaching hospital" engineering model, and built/launched USC's 1st indigenous satellites.

(Since 2006)

Director, *USC Aerospace Technology and Systems Center, Information Sciences Institute, Marina Del Rey CA*

Pioneered fractional cost global wireless communications tracking system, new design-synthesis tool to cut design time down to days from months for highly complex systems development, combining information science architecture with aerospace and high technology device development. **(2006 to 2010)**

Vice President of Engineering & CFO *Millennium Space Systems Inc.*

Co-founder and project manager for advanced contracts development with DoD, DARPA and large aerospace firms for spacecraft systems engineering, bid and proposal generation, and project cost risk assessment. Company was profitable from day 1 and in less than 5 years received first flight effort contract, beating larger companies. **(2001 to 2006)**

Managing Director *Vanguard Space Corporation, Los Angeles CA; London England*

Developed program management plan, technical architecture, contractor structure, and 10 year \$150 M business plan. Architected costing structure, financial to technical risk assessments and implementation plans. **(2000 to 2001)**

Executive Board Member *Vanguard Space – AG, Bremen Germany*

Served as one of three principal executive directors (Vorstand) that directed the day-to-day operations of a startup space business. Presented technical and business plans to investors, international insurance underwriter community members, international aerospace corporations and equity financial institutions. **(2000 to 2001)**

Program Manager *Space Vehicles Directorate, Air Force Research Laboratory, Albuquerque NM*

Created and oversaw a \$65M+ multi-agency micro-satellite demonstration series program that successfully developed a new class of spacecraft. This Congressionally directed program was approved through the Office of Science and Technology of the President and the Office of the Vice President. Managed more than 120 personnel and multiple technology development contracts (\$2-45M) in 15 different States. **(1996-2000)**

Chief, Spacecraft Design Group, *Space Experiments Directorate, Air Force Research Laboratory, Edwards AFB and Albuquerque NM*

Held various positions with increasing responsibility from Project Manager to Chief of the Spacecraft Design Group, where the primary objective was to manage and mentor a team of 15 government and 75 contractor employees to support building a \$5M satellite integration facility, and develop small satellites for advanced missions. Served as architect/program manager for the \$2M ACAT Lunar Landing vehicle demonstration flight. **(1987-1996)**

Educational Background

M.E., Aerospace & Ocean Engineering, Virginia Polytechnic Institute, Blacksburg VA

B.S., Aerospace Engineering, Boston University, Boston MA

Copyrights and Patents

SYSTEM XV: A Computer Tool for Regulation XV Plan Generation, Barnhart, David Allan; U.S. Patent and Copyright Office, Washington, D.C., Software Copyright 1990.

EPOCH: Elementary Program in Orbital Mechanics, Barnhart, David Allan, U.S. Patent and Copyright Office, Washington D.C., Software Copyright 1986.

SPIDR: Systems Portal for Design in Realtime Synthesis Tool, Barnhart, David Allan; Kichkaylo, Tatiana; Hoag, Lucy; Will, Peter, USC ISI Intellectual Property Patent application, April 2007.

Deployable Parabolic Antenna for Cubesats, Barnhart, David Allan; Smolik, John; Sachs, Jeff; Vartanians, Emin, USC ISI Intellectual Property patent disclosure, February 2007

Cubesat Quad Monopole Automatic Deployment Module, Barnhart, David Allan; Smolik, John; Sachs, Jeff; Bezouska, William; Barrett, Tim; USC ISI Intellectual Property patent disclosure, March 2010.

Multi-Armed Soft Capture System, Barnhart, David Allan; Rogers, Rebecca. USC Patent US 2021/0094709 A1.

USING GENETIC ALGORITHMS FOR SAFE SWARM TRAJECTORY OPTIMIZATION, Barnhart, David Allan; Rughani, Rahul; Presser, Tyler. USC0301PRV 2020-238-01, 17/568,462.

Soft Robotics, Autonomous, Space Inspection, Crawling Robot, USC 0321PRV, 2021-242-01, 63/282,934

Genderless Docking System for Spacecraft, Barnhart, David Allan; Nguyen, Jonathan. USC ISI Intellectual Property patent disclosure, December 2021.

System and Method for Enabling Accelerated Remote Interface Validation and Space Platform Resource Optimization, Barnhart, et al, USPTO Provisional Filed September 2023.

Honors and Awards

- Use Inspired Research Award USC
- Office of Secretary of Defense Exceptional Public Service Medal
- USC Mentoring Award for Astronautics and Space Technology Division
- AIAA Space Systems Award, Team Member Recipient for Boeing/AFRL XSS-10 Spacecraft Mission
- Elected Member, National AIAA Space Logistics/Space Systems Technical Committee
- Elected Associate Fellow, American Institute of Aeronautics and Astronautics
- Air Force Research Laboratory, "Program Manager of the Quarter Award"
- Acquisition Professional Development Program Certification Level III: Program Management and Systems Engineering
- ACAT Team Honored at 25th Anniversary Celebration of Apollo XI by Vice President Al Gore, Los Angeles CA

Publications

Journal/News Articles:

Barnhart, D., Mukherjee, R., Chakravarthini Rai, M., D'Amore, N., and Henshaw, G., “**Robotic in-space servicing, assembly and manufacturing**”, Editorial in *Frontiers of Robotics and AI*, 2024-08-09, part of ISSN: 2296-9144, DOI: 10.3389/frobt.2024.1421697.

"What is...Safe? Baby don't hurt me, don't hurt me, no more", LinkedIn Article, August 2019

"Of Beetles and KKV's... the dichotomy of dual use in Space", Published on LinkedIn, May 9, 2016.

"On the innovation frontline in space", Published on LinkedIn, April 15, 2016

"Space Technology: trees at the root of living spaceships", *Financial Times* article, February 12, 2016, Clive Cookson.

"Enabling the 2nd Generation in Space: Building blocks for large scale space endeavors", Barnhart, D., Garretson, P., and Will, P., *Journal of British Interplanetary Society*, Vol. 67, April 2014. (First presented at DARPA/NASA 100 Year Starship Conference, Orlando Florida, Oct 2011.)

"Space Systems Year in Review", Barnhart, D., Murphy, T., *Aerospace America*, December 1999.

"Airborne Telemetry and Instrumentation Package(ATIP): Development, Testing and Results", Barnhart, D., McMath, A., AFAL TR-89-058, Air Force Astronautics Laboratory, Edwards Air Force Base, CA, October 1989.

"KHIT Mission Duty Cycle Test", Ductor, D., Dillon, C., Wallace, E., Barnhart, D., Lauffer, S. AFAL TR-88-113, Air Force Astronautics Laboratory, Edwards Air Force Base, CA, December 1988.

"KHIT Facility Activation Test", Ductor, D., Dillon, C., Barnhart, D., Lauffer, S., Powers, M., AFAL TR-88-099, Air Force Astronautics Laboratory, Edwards Air Force Base, CA, October 1988.

"Vertical Drop Testing: KKV Hover Flight Risk Reduction", Barnhart, D., Brouillard, M., Bortins, R., Givens, R., and McMath, A., AFAL TR-88-087, Air Force Astronautics Laboratory, Edwards Air Force Base, CA, August 1988.

Books/Book Chapters:

NEXT GENERATION CUBESATS, Chapter 2, “Comparing Platform Paradigms: Cubesats versus Smallsats”, D. Barnhart and R. Rughani, 2023/1/1, Pages 57-78 by Elsevier Publishing, ISBN 9780128245415.

Vol. V, Space Science Series, HAZARDS DUE TO COMETS AND ASTEROIDS, Part V: "DoD Technologies & Missions of Relevance to Asteroid and Comet Exploration", S. Nozette, L. Pleasance, D. Barnhart, and D. Dunham, Copyright 1994

Other Publications:

Barnhart, D., Topper, H., Lintala, P., Hill, J., Rajguru, A., Haq, S., Adam, H., Ebrahimi, M., and Deliwala, Y., “**Enabling Safe Efficient Rendezvous: The value of Cooperative and Communicative RPO**”, IAC-24,B6,IP,47,x81526, 75th International Astronautical Congress (IAC), Milan Italy, October 2024

Feldman, S., Khatun, K., Kingsbury, O., Barnhart, D., and Weed, R., “**A Levitated Displacement Interferometer Thrust Stand for Characterization of Propellant-less Propulsion Concepts**”, IAC-24,C4,IP,99,x82204, 75th International Astronautical Congress (IAC), Milan Italy, October 2024

Garrido, C., Yagi, T., Swaminathan, A., Awbrey, A., and Barnhart, “**Multi-Source Sensor Fusion: Challenges and Opportunities for the Future of Space Operations**”, IAC-24,D1,IP,29,x88188, 75th International Astronautical Congress (IAC), Milan Italy, October 2024

Hill, J., Lintala, P., Stratton, M., Barnhart, D., “**3DOF Air Bearing Platform As a Testbed For A Gecko Gripper Active Debris Removal Mechanism**”, AC-A6,IP,1,x90664, 75th International Astronautical Congress (IAC), Milan Italy, October 2024

Stratton, M., Pastizzo, J., MacRae, G., Hill, J., and Barnhart, D., “**Optimizing Element & System-level Compliance of Robotic, Gecko Adhesion-based Grippers to the Unknown Shapes and Sizes of Space Debris Targets**”, IAC-24,A6,5,6,x90620, 75th International Astronautical Congress (IAC), Milan Italy, October 2024

Kristina Andreyeva, Griffin MacRae, Nathan Migeon, Thomas Nicol, Marie Cros-Coitton, and David Barnhart,” **Mobility of a Soft Conformable Multi-Limited Robotic Actuated by Shape Memory Alloy Wires**”, 2024 IEEE Aerospace Conference, 09 March 2024, DOI: 10.1109/AERO58975.2024.10521380

Andreyeva, K., Topper, H., Lintala, P., Griffith, T., and Barnhart, D., “**Feasibility of Multi-Axial Gecko Gripping for Active Debris Removal**” IC-23,C2,7,6,x88970, 74th International Astronautical Congress, Baku Azerbaijan, November 2023

Garrido, C., Lin, S., Di, J., Bergstrom, J., Rios, B., Byrne, B., Clements, S., Dhabekar, Dadhich, B., and Barnhart, D., “**MAVERIC: Exploring Space Visualization Technology through Academic Flight Programs**”, Small Satellite Conference August 5-10th 2023, Utah State University, UT

Rajguru, A., Eyre, E., Ebrahimi, M., Barnhart, D., Adam, R., Griffith, T., Chibuzor, D., Haq, S., Nguyen, J., and Le, J., “**CLINGERS: Optimizing RPO Ease for Assembly Operations**”, 2022 AAS/AIAA Astrodynamics Specialist Conference, Aug 7-11, 2022, AAS 22-580.

Barnhart, D., Bacher, D., Davies, J., Ridgeway, J., Ramesh, S., Madrecha, S., Badii, A., Stevlingson, C., Reynoso, E., Struhl, J., Piekarewicz, P., Thonapalin, P., and Dajani, K., “**Low Temperature Solid Propellant Investigations for Mechanical Properties**”, AIAA Aviation Forum, Chicago IL, 27 June 2022.

Renteria, M., Blair, C., Mellano, C., Snow, H., Do, K., Cislawski, B., Estrada, S., and Barnhart, D., “**STARFISH: Soft Translatable Actuated Robot for in Space Handling**”, 72nd International Astronautical Congress (IAC), Dubai, United Arab Emirates, 25-29 October 2021, AC-21,B6,IP,5,x63656

Smat, M., Barnhart, D., Narain, A., Brieler, I., Gianousopolous, D., Sharad, A., Weingaertner, R., Wang, H., Orozco, J., Tran, T., Nagpal, S., and Foster N., “**The Architecture of a Safe Low Cost Earth Based Lunar Landing Test Bed for the Validation of Experimental Flight and new Technologies**”, 72nd International Astronautical Congress (IAC), Dubai, United Arab Emirates, 25-29 October 2021, IAC-21,D5,1,x65885

Renteria, M., Estrada, S. D., Cislawski, B.S., Snow, H., Blair, C., Do, K., Mellano, C., Choi, E., Barnhart, D. A., “**STARFISH: Soft Translatable Advanced Robot for In-Space Handling**”, 16th International Conference on Space Operations, Cape Town, South Africa, 3 - 5 May 2021, pp1619. (Virtual)

Rughani, R., Barnhart, D.A., “**Sensor Fusion Kalman Filtering for Stability and Control of Satellite Swarms**”, 2021 International Space Operations Conference. Cape Town, South Africa, May 3-5, 2021 (Virtual)

Smat, M., Russo, A., Famutimi, O., Puranik, I., Osmundson, A., Narain, A., Bernacchia, D., Rughani, R., and Barnhart, D., “**Generation-II Lunar Entry Approach Platform For Research On Ground: a novel concept for low cost, high longevity autonomous operations on the Moon**”, 71st International Astronautical Congress (IAC) – The CyberSpace Edition, 12-14 October 2020, IAC-20,A3,2B,4,x56367

Rughani, R., Barnhart, D.A., “**Safe Construction in Space: Using Swarms of Small Satellites for In-Space Manufacturing**”, 34th Annual Small Satellite Conference. Logan, Utah, 1-6 August 2020. In Press

Smat, M, Barnhart, D., Villafaña L., Overman, K., “**Cellular Based Aggregated Satellite System: The Design and Architecture of a Three Degree of Freedom Near-Frictionless Testbed for Ground Validation of CubeSat Operations.**” 34th Annual Small Satellite Conference. Logan, Utah, 1-6 August 2020.

Villafana, L., Yuan, J., Broadus, L., Su, W., Carlton, C., Norrell, A., Rughani, R., Barnhart, D., “**MAGNETO: Mapping the Earth’s Magnetic Field at 300km using COTS Sensors**”, 34th Annual Small Satellite Conference, Logan, Utah, 1-6 August 2020, In Press

Carlton, C., Manness, E., and Barnhart, D., “**Low Cost Magneto-Sphere Measurement: Leveraging Fusion of Low Data Rate Downlink with Amateur Radio Community**”, 34th Annual Small Satellite Conference, Logan, Utah, 1-6 August 2020, In Press

Barnhart, D., Rughani, R. Allam, J., and Clarke, K., “**Initial Safety Posture Investigations for Earth Regime Rendezvous and Proximity Operations**”, Journal of Space Safety Engineering, July 13, 2020, Inpress.

Barnhart, D.A., and Rughani, R., “On-orbit servicing ontology applied to recommended standards for satellites in earth orbit”, Journal of Space Safety Engineering, <https://doi.org/10.1016/j.jisse.2020.02.002>

Rughani R., Barnhart, D.A. "**Using Genetic Algorithms for Safe Swarm Trajectory Optimization.**" 30th AIAA/AAS Space Flight Mechanics Meeting. Orlando, Florida, 6-10 January 2020

Narayanan, S., Barnhart, D., Rogers, R., Dean, G., Bernstein, S., Singh, A., Almeida, O., Sampathkumar, S., Maness, E. and Rughani, R. USC; Ruffatto, D./, Schaler, E., Van Crey, N., Bhanji, A., and Junkins, E., JPL. " **REACCH - Reactive Electro-Adhesive Capture Cloth Mechanism to Enable Safe Grapple of Cooperative/Non-Cooperative Space Debris.**" 30th AIAA/AAS Space Flight Mechanics Meeting. Orlando, Florida, 6-10 January 2020

Barnhart, D., Duong, R., Villafana, L., Patel, J., and Annapureddy, S., "**The Development of Dynamic Guidance and Navigation Algorithms for Autonomous On-Orbit Multi-Satellite Aggregation**", 70th International Astronautical Congress (IAC) Washington DC Oct 2019, IAC-19. D1.1.2

Rughani, R., Villafana, L., and Barnhart, D., "**Swarm RPO and Docking Simulation on a 3DOF Air Bearing Platform**", 70th International Astronautical Congress (IAC) Washington DC Oct 2019, IAC-19-D1.2.9

Rughani, R., Rogers, R., Allam, J., Narayanan, S., Patil, P., Clarke, K., Lariviere, M., Du Plessis, J., Villafana, L., Healy, D., Bernstein, S., and Barnhart, D., "**Improved CubeSat Mission Reliability Using a Rigorous Top-Down Systems-Level Approach**", 70th International Astronautical Congress (IAC) Washington DC Oct 2019, IAC-19-B4.IP.17

Barnhart, D., Rughani, R., "**On-Orbit Servicing Ontology applied to Recommended Standards for Satellites in Earth Orbit**", 70th International Astronautical Congress (IAC) Washington DC Oct 2019, IAC-19-D1.6.9

Barnhart, D., Rughani, R. Allam, J., and Clarke, K., "**Initial Safety Posture Investigations for Earth Regime Rendezvous and Proximity Operations**", 10th International IAASS Conference, May 15, 2019, El Segundo, CA.

Bezouska, W. and Barnhart, D., "**Sensor Selection Strategies for Satellite Swarm Collaborative Localization**", 2019 Astrodynamics Specialist Conference, August 11, 2019. AAS 19-920.

Bezouska, W. and Barnhart, D., "**Spacecraft Pose Estimation and Swarm Localization performance under Varying Illumination and Viewing Conditions**", 2019 AAS/AIAA Space Flight Mechanics Meeting, Maui, HI, AAS 19-405.

Bezouska, W. and Barnhart, D., "**Visual sensor selection for satellite swarm cooperative localization**", SPIE 2019 Defense and Security Conference in Baltimore, MD.

Barnhart, D., R. Rughani, Allam, J., Weeden, B., Slane, F., and Christensen, I., "**Using Historical Practices to Develop Safety Standards for Cooperative On-Orbit Rendezvous and Proximity Operations**", 69th International Astronautical Congress (IAC) Bremen Germany 1-5 October 2018, IAC-18,D1,5,8,x45161

Gyslla D Bento da Silva, Claudia Celeste Celestino de Paula Santos, David Barnhart, "**Estudo otimizado sobre Rendezvous com Detritos Espaciais Brasileiros em LEO**", Proceeding Series of the Brazilian Society of Computational and Applied Mathematics, 2018/12/19

Ritter, M., and Barnhart, D., "**Geometry Characterization of Electro-adhesion Samples for Spacecraft Docking Application**", IEEE Aerospace Conference, March 2017, Big Sky Montana, 978-1-5090-1613-6/17/31:00c 2017 IEEE

Bento da Silva, G., and Barnhart, D., "**Optimized R/B's Rendezvous Study for Active Debris Removal**", Center for Orbital Debris Education and Research (CODER) Conference 2016, University of Maryland, College Park, MD, November 15-17, 2016.

Rogers, C., Barnhart, D., and Crago, S., "**The Maestro Flight Experiment: A 49-Core Radiation Hardened Processor in Space**", IEEE Aerospace Conference, March 2016, Big Sky, Montana, 978-1-4673-7676-1/16.

Barnhart, D., and Atudosiei, N., "**Growing Life in Space: Sustainable Bioterra for Mankind's Future on Earth and in Space**", Management and Legislation in Agriculture, Agrotourism, Food, Agrifood Economics, Environment and Consumer Protection Conference, October 2015, Bucharest, Romania.

Barnhart, D., L., Hill., Fowler, E., Hunter, R., Hoag, L., Sullivan, B., and Will, P., "**A Further Look at Potential Impact of Satlets on Design, Production, and Cost of Satellite Systems**", *Small Sat Conference*, August 2014, Logan, Utah, SSC14-V-6.

Barnhart, D., Will, P., Sullivan, B., Hunter, R., Hill, L., "**Creating a Sustainable Assembly Architecture for Next-Gen Space: The Phoenix Effect**", *National Space Symposium Paper*, May 2014, Colorado Springs CO.

Barnhart, D., Sullivan, B., Hill, L., Fowler, E., Hoag, L., Mook, M., Chappie, S., Kennedy, T., Kelm, B., and Vincent, K., **“Phoenix Program Status 2013”**, *AIAA Space 2013 Conference*, AIAA 2013-5341.

Barnhart, D., Hill, L., Fowler, E., Hoag, L., Sullivan, B., Will, P., **“A Market for Satellite Cellularization? A first look at satlet morphology’s implementation and potential impact on the space industry”**, *AIAA Space 2013 Conference*, AIAA 2013-5486.

Barnhart, D., **“The Phoenix Project.”** <http://www.oosa.unvienna.org/pdf/pres/stsc2013/tech-11E.pdf>, *50th session of the UN COPUOS Scientific and Technical Subcommittee*, February 13, 2013.

Barnhart, D., and Sullivan, B., **“Economics of Repurposing In Situ Retired Spacecraft Components.”** *AIAA SPACE 2012 Conference & Exposition*: AIAA 2012-5304.

Barnhart, D., Sullivan, B., Hill, L., Will, P., Chappel, L., Ratti, J., Benedict, B., and VanOmmering, G., **“DARPA Phoenix Payload Orbital Delivery System (PODs)”** *AIAA SPACE Conference & Exposition*, AIAA 2013-5484, San Diego, CA, 2013.

Barnhart, D., Hill, L., Turnbull, M., and Will, P., **“Changing Satellite Morphology through Cellularization.”** *AIAA SPACE Conference & Exposition*, AIAA 2012-5262, Pasadena, CA, 2012.

Barnhart, D., Will, P., and Garret, P., **“Enabling the 2nd Generation in Space: Building blocks for large scale space endeavors”**, *100 Year Starship Conference*, Orlando Florida, 2011, and *Journal of the British Interplanetary Service-preliminary journal article* 2014.

Hoag, L., Kichkaylo., T. and Barnhart, D., **“A Systems Architecting Approach to Automation and Optimization of Satellite Design in SPIDR”**, *International Conference on Engineering and Meta-Engineering*, April 6th - 9th, 2010 – Orlando, Florida

D. Barnhart, T. Barrett, J. Sachs, P. Will, **“Development and Operation of a Micro-Satellite Dynamic Test Facility for Distributed Flight Operations”**, *AIAA Space 2009 Conference*, AIAA 2009-6443, Pasadena CA

Barnhart, D., Kichkaylo, T., and Hoag, L., **“SPIDR: Integrated Systems Engineering Design-to-Simulation Software for Satellite Build”**, *7th Annual Conference on Systems Engineering Research*, Loughborough University, England, April 2009

Rauf, A. and Barnhart, D., **“An integrated and robust finite element modeling technique to study and investigate analysis results in a three-unit Cubesat structure under different analysis assumptions”**, *ASME Grad Student Conf*, April 4, 2009

D. Barnhart, J. Sullivan, P. Will & M. Gruntman, **“Advancing Exploration Risk Reduction and Workforce Motivation through Dynamic Flight Testing”**, *AIAA Space 2007 Conference*, AIAA 2007-81635, September 2007

D. Barnhart, T. Barrett, J. Kunc, R. Karkhanis, E. Vartanian, M. Guzman and S. Hesar, **“ USC’s Approach to Satellite-Based, Hands-On, Training: The Engineering Teaching Hospital ”**, *AIAA Space 2007 Conference*, AIAA 2007, September 2007

D. Barnhart, M. Gruntman, A. Anderson, O. Faghfoor, J. Cheng, **“Hands On Space Flight Risk Reduction Training Through Ground Based Dynamic Flight Testing”**, *58th IAC*, Hyderabad, India , IAC-07-E1.4.10, September 2007

D. Barnhart, T. Barrett, O. Rahman, C. Raskin, M. Rudolph, **“Lunar descent and landing technique development through real-time earth based flight dynamics operations”**, *58th IAC*, Hyderabad, India , IAC-07-A3.IA.05, September 2007

“Can-Do versus Do it Yourself”, Barnhart, D., *Space News Article*, March 2003

Barnhart, D., Hunter, R., Weston, A., Chioma, V., Steiner, M., and Larsen, W., **“XSS-10 micro-satellite demonstration”**, AIAA 98-5298

Barnhart, D., Coombs, C., Bryant, K., Knight, C., Hertzberg, D., Christmas, J., and Scott, D., **“Lunar Applications For Payload Delivery and Surface Analysis Using Microspacecraft”**, *46th IAC*, Oslo Norway, IAA-95-IAA.11.1.04, October 1995.

BT Patel, M. Martinz-Sanchez, G.R. Ricker, D. Tilley, D. Barnhart, H. Alexander, R. Myeres, E. Pencil, G. Horvat and J. Samella, **“Electric Propulsion for an Interplanetary Astrophysics Mission”**, *24th International Electric Propulsion Conference*, “Leningradsky 55”, Congress Center, Moscow, Russia, IEPC-95-239, September 19-23 1995.

Barnhart, D., Tilley, D., Wojnar, R., and Spores, R., "**The Case for Small Spacecraft: An Integrated Perspective on Electric Propulsion**", *24th International Electric Propulsion Conference*, Moscow, Russia, IEPC-95-148, September 1995.

Sanchez, M., Ricker, A., Barnhart, D., and Tilley, D., "**An Electric Propulsion System for Interplanetary Spacecraft**", *24th International Electric Propulsion Conference*, Moscow, Russia, IEPC-95-243, September 1995.

Clauss, C., Tilley, D., and Barnhart, D., "**Benefits of Low-Power Stationary Plasma Thruster Propulsion For Small Satellites**", *10th AIAA/Utah State Small Satellite Conference*, Logan Utah, 95-011, September 1995.

Barnhart, D., McCombe, J., and Tilley, D., "**Electric Propulsion Integration Activities on the MSTI Spacecraft**", *23rd International Electric Propulsion Conference*, Seattle, WA, 93-011, September 1993.

Barnhart, D., Feig, J., and Grigsby, E., "**MSTI: Small Space Platform Program**", *SPIE/OE Optoelectronics Conference In Aerospace and Remote Sensing*, Orlando FL, 1940-20, April 1993

Barnhart, D.A., "**EPOCH: Electric Propulsion Characterization Experiment**", *AIAA/SAE/ASME/ASEE 28th Joint Propulsion Conference*, Nashville, TN, 92-3196, July 1992.

Brophy, J.R., Barnett, J.W., Sankovic, J.M., and Barnhart, D.A., "**Performance of the Stationary Plasma Thruster: SPT-100**", *AIAA/SAE/ASME/ASEE 28th Joint Propulsion Conference*, Nashville, TN, 92-3155, July 1992.

Barnhart, D., Phillips Laboratory, Sankovic, J., NASA Lewis Research Center, "**On-Orbit Characterization of Electric Propulsion on LEO Satellites**", *29th Space Congress - Cape Canaveral, FL*, April 1992.

Hall, S., and Barnhart, D., "**A Range Safety Flight Testing Technique using an External Camera Tracking System**", *Society of Flight Test Engineers Conference*, Reno, Nevada, September 1989.

Barnhart, D., Hall, S., Wojnar, R., Wallace, E., Zaremba, P., Fulk, C., Cronauer, T., and Zarobsky, C., "**Facility Interface Considerations in Testing KKV Rocket Propulsion Technology**", *AIAA/ASME/SAE/ASEE 25th Joint Propulsion Conference*, U.S. Naval Post Graduate School, Monterey, CA, July 1989.

"KHIT Mission Duty Cycle Test", Ductor, D., Dillon, C., Wallace, E., Barnhart, D., Lauffer, S. AFAL TR-88-113, Air Force Astronautics Laboratory, Edwards Air Force Base, CA, December 1988.

Barnhart, D., and Lauffer, S., "**Operational Static Strapdown Test of an Integrated Kinetic Kill Vehicle**", *AIAA Missile Sciences Conference (SECRET)*, U.S. Naval Post Graduate School, Monterey, CA, November 1988.

"KHIT Facility Activation Test", Ductor, D., Dillon, C., Barnhart, D., Lauffer, S., Powers, M., AFAL TR-88-099, Air Force Astronautics Laboratory, Edwards Air Force Base, CA, October 1988.

"Vertical Drop Testing: KKV Hover Flight Risk Reduction", Barnhart, D., Brouillard, M., Bortins, R., Givens, R., and McMath, A., AFAL TR-88-087, Air Force Astronautics Laboratory, Edwards Air Force Base, CA, August 1988.

Barnhart, D., McKee, B., and Webber, T., "**Flight Dynamics and Control Facility for Ground Based Flight Testing of Integrated KEW Technology**", *AIAA 4th Flight Test Conference Proceedings*, San Diego, CA, May 1988.

"Considerations for Radio Frequency Use in a Multipath Environment and Subsequent Telemetry Clarification's using Specialized Schemes", Barnhart, D., Hewlett, M., Stephens, W., and Taft, D., AFAL TR-88-041, Air Force Astronautics Laboratory, Edwards Air Force Base, CA, April 1988.

Barnhart, D., Weston, A., and Trikas, T., "**KEW Propulsion System Performance Requirements**", *JANNAF Conference Proceedings*, San Diego, CA, December 1987.

"Out-of-Plane Launch Considerations for Space Based Kinetic Energy Weapons", Lutze, F.M., Cliff, E.M., Kelley, H.J., Schumacher, P.W., Barnhart, D.A., Research Report, Optimization Incorporated, Blacksburg, VA, July 1987.

"EPOCH: An Interactive Orbital Mechanics Package for Microcomputer Applications", Barnhart, D.A., Masters Report,
Department of Aerospace and Ocean Engineering, VPI & SU, June 1987.