



David Gerhardt, PhD

Systems Engineer
Seattle, WA




+1 (720) 722-3445

✉ dtgerhardt@gmail.com

🌐 <https://davidgerhardt.com>

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EDUCATION

- May 2014  Ph.D., “Small Satellite Passive Magnetic Attitude Control,” Aerospace Engineering Sciences, University of Colorado at Boulder (Advisor Dr. Scott Palo)
- Dec. 2011  M.S. in Aerospace Engineering Sciences, University of Colorado at Boulder
- May 2008  B.S. in Aerospace Engineering, Virginia Polytechnic Institute and State University (Summa Cum Laude)

WORK EXPERIENCE

- 1/2019 –  **First Mode**, Seattle, Washington
Senior Systems Engineer
Applying Systems engineering principles to projects both celestial and terrestrial.
- 3/2018 – 12/2018  **Orbital Wisdom LLC**, Seattle, Washington
Founder / Consultant
Systems engineering and ADCS development to support space missions.
- Systems engineering support for a major aerospace company lunar lander.
 - Established requirements hierarchy & framework using Doors Next Gen (DNG).
 - Performed decomposition to establish initial lander requirements.
 - De-conflicted rocket / satellite heritage to establish mass management plan.
 - Operational support of on-orbit 6U asset for a small satellite company.
 - Updated flight s/w to provide additional ADCS functionality.
 - UKF tuning using ground-based processing of received telemetry.
 - Implemented real-time TLE estimation using GNSS sensor data.
- 10/2016 – 2/2018  **Planetary Resources, Inc.**, Redmond, Washington
Principal Systems Engineer
Systems engineering, mission design, and technical leadership for multiple projects.
- Lead Systems Engineer for a commercial asteroid resource exploration mission
 - Provided technical leadership from initial objectives to pre-PDR
 - Concept of Operations for single-launch, multi-probe deep-space mission
 - Trajectory analysis for target selection (cruise & proximity operations)
 - Dynamic simulation to ensure feasibility of timeline for data generation & return
 - Established processes & led training on requirements & technical resources
 - Led requirements elicitation & analysis across functional teams
 - Enabled technical communication via project structure & documentation plan
 - Other work
 - Mission design / proposal for low-cost Enceladus life-detection mission
 - Launch and Early Operations Phase (LEOP) development for Arkyd-6 6U CubeSat

3/2014 –
4/2016**GomSpace A/S**, Aalborg, Denmark
Systems Engineer

Technical leadership for three nanosatellite missions at various project phases.

- Lead Systems Engineer for GOMX-3, the first ESA In-Orbit Demonstration CubeSat
 - Carried design from statement of work to in-orbit commissioning review
 - Developed and maintained requirements, budgets, technical analysis, etc.
 - Defended design by leading multiple reviews with ESA mgmt. & contractors
 - Led configuration, integration, testing, and operation of EM & FM satellite models
 - Satellite was a complete success; operated until de-orbit after >1 year in LEO
- Lead Systems Engineer for SEAM, an FP7-funded scientific CubeSat
 - Carried design from statement of work through EM integration & test
 - Worked between 8 international companies to develop coherent design
- Lead Systems Engineer for GOMX-4A/B mission, sister ESA / Danish 6U CubeSats
 - Carried design from Statement of Work through PDR
 - Adapted 3rd party prop. module to in-development internal 6U platform
 - Mentored student intern in system engineering role over 6 month period

8/2009 –
1/2014**University of Colorado**, Boulder, Colorado
Systems Engineer

Led 60+ students through the creation and operation of a 3 kg satellite for space weather investigation. The satellite surpassed all mission goals and made science measurements for 438 days, nearly 5× the full mission success duration.

- Served as Lead Systems Engineer from proposal through in-orbit operations
- Developed and maintained requirements, technical budgets, and risk analysis
- Designed, implemented, and tested Passive Magnetic Attitude Control system
- Planned & executed integration and system testing incl. day-in-the-life, calibration, end-to-end communication, TVAC, and vibe
- Created & maintained autonomous commanding system for UHF ground station
- Designed an Extended Kalman Filter for attitude determination of a PMAC satellite
- Oversaw ground ops and performed anomaly analysis & correction

PROFESSIONAL SERVICE

2017 – Advisor to the first Guatemalan satellite university team
 Aug 2017 Judge for AAS/AIAA Astrodynamics Specialist Conference Student Competition
 June 2017 Reviewer for University of Washington's DUBSAT-1 CubeSat PDR
 2016 Reviewer for IEEE Transactions on Aerospace and Electronic Systems
 2011 – 2013 AP Calculus Tutoring
 2007 – 2008 Vice President, Sigma Gamma Tau Aerospace Honor Society at Virginia Tech

JOURNAL ARTICLES

1. X. Li, S. Palo, R. Kohnert, **D. Gerhardt**, L. Blum, Q. Schiller, D. Turner, W. Tu, N. Sheiko, and C.S. Cooper. "Colorado Student Space Weather Experiment: Differential flux measurements of energetic particles in a highly inclined low Earth orbit" in *Dynamics of the Earth's Radiation Belts and Inner Magnetosphere, Geophys. Monogr. Ser.*, Vol. 199, edited by D. Summers et al., 385–404, AGU, Washington, D.C., 2012, doi:10.1029/2012GM001313
2. X. Li, S. Palo, R. Kohnert, L. Blum, **D. Gerhardt**, Q. Schiller, and S. Califf, "Small Mission Accomplished by Students – Big Impact on Space Weather", *Space Weather*, Vol. 11, 2013, doi:10.1002/swe.20025
3. X. Li, Q. Schiller, L. Blum, S. Califf, H. Zhao, W. Tu, D.L. Turner, **D. Gerhardt**, S. Palo, S. Kanekal, D.N. Baker, J. Fennell, J.B. Blake, M. Looper, G.D. Reeves, and H. Spence, "First Results from CSSWE CubeSat: Characteristics of Relativistic Electrons in the Near-Earth Environment During the October

2012 Magnetic Storms”, *J. Geophys. Res. Space Physics*, Vol. 118, 2013,
doi:10.1002/2013JA019342

4. **D. Gerhardt**, S. Palo, Q. Schiller, L. Blum, X. Li, and R. Kohnert, “The Colorado Student Space Weather Experiment (CSSWE) On-Orbit Performance”, *Journal of Small Satellites*, Vol. 3, No. 1, 2014.
5. **D. Gerhardt** and S. Palo, “Volume Magnetization for System-Level Testing of Magnetic Materials within Small Satellites”, *Acta Astronautica*, Vol. 127, 2016.
doi:10.1016/j.actaastro.2016.05.017
6. S. Nag, J. Rios, **D. Gerhardt**, and C. Pham, “CubeSat Constellation Design for Air Traffic Monitoring”, *Acta Astronautica*, Vol. 128, 2016,
doi:10.1016/j.actaastro.2016.07.010
7. K. Zhang, X. Li, Q. Schiller, **D. Gerhardt**, H. Zhao, and R. Millan, “Detailed characteristics of radiation belt electrons revealed by CSSWE/REPTile measurements: Geomagnetic activity response and precipitation observation”, *J. Geophys. Res. Space Physics*, Vol. 122, 8434–8445, 2017,
doi:10.1002/2017JA024309
8. G. Nies, M. Stenger, J. Krcl, H. Hermanns, M. Bisgaard, **D. Gerhardt**, B. Haverkort, M. Jongerden, K. Larsen, and E. Wognsen, “Mastering Operational Limitations of LEO Satellites - The GOMX-3 Approach”, *Acta Astronautica*, 151, 726 - 735, 2018,
doi:10.1016/j.actaastro.2018.04.040

SELECTED CONFERENCE PAPERS

1. **D. Gerhardt**, and S. Palo, “Passive Magnetic Attitude Control for CubeSat Spacecraft.” In Small Satellite Conference, Utah State University, Aug. 2010.
2. Q. Schiller, **D. Gerhardt**, L. Blum, X. Li, and S. Palo, “Design and Scientific Return of a Miniaturized Particle Telescope Onboard the Colorado Student Space Weather Experiment (CSSWE) CubeSat”, In 35th IEEE Aerospace Conference, Big Sky, MT, Mar. 2013.
3. L. Alminde, K. Kaas, M. Bisgaard, J. Christiansen, and **D. Gerhardt**, “GOMX-1 Flight Experience and Air Traffic Monitoring Results”, In Small Satellite Conference, Utah State University, Aug. 2014.
4. **D. Gerhardt**, M. Bisgaard, L. Alminde, R. Walker, M. Fernandez, and J. Issler, “GOMX-3: Mission results from the Inaugural ESA In-Orbit Demonstration CubeSat”, In Small Satellite Conference, Utah State University, Aug. 2016.
5. E. Frank, **D. Gerhardt**, S. Anunsen, K. Bradford, K. Desai, M. Scholtz, J. Shriver, C. Voorhees, C. Lewicki, “Planetary Resources’ Commercial Approach to Asteroid Mineral Exploration”, In 49th Lunar and Planetary Science Conference, 2018.
6. R. Holst, J. Nielsen, **D. Gerhardt**, and J.A.G. Ahumada, “Attitude and Orbit Control Results of the GOMX-4 Tandem CubeSat Mission”, International Astronautical Congress, Bremen, 2018.

FAVORITE THINGS

- MATLAB / Simulink
- Systems Tool Kit (STK) / NASA GMAT
- Linux (vim > emacs)
- git
- CAD (SolidWorks > Inventor)
- Python
- C/C++
- LabVIEW
- Foosball (defense)
- L^AT_EX