James W. Cutler

University of Michigan
1320 Beal Avenue
3013 FXB Building
Ann Arbor, MI 48109

Voice: (734) 615-7238
Fax: (734) 763-0578
jwcutler@umich.edu
http://www.umich.edu/~jwcutler/

Education

1998-2005: Ph.D., Stanford University, Electrical Engineering. Research focus: cyberinfrastructure and high-availability mechanisms for satellite operation systems.

1996-1998: M.S., Stanford University, Electrical Engineering. Research focus: innovative small satellite technologies and radiation hardening of off-the-shelf electronics.

1992-1996: B.S, Purdue University, Computer and Electrical Engineering. Research focus: low power microprocessors and self-contained, biological life support systems. Graduated with distinction.

Research Interests (a summary, but not limited to the following)

Space Systems – I am interested in fundamental enhancements to our ability to fly space missions with a particular emphasis on nano and pico satellites. Current work includes advanced space communication (both in orbit and on the ground), attitude determination and control, power systems, and remote sensing missions. Currently, I am co-principal investigator on an NSF funded grant to build the Radio Aurora Explorer (RAX). The primary scientific objective of the Radio Aurora Explorer (RAX) mission is to understand the microphysics of plasma instabilities that lead to field-aligned irregularities (FAI) of electron density in the polar lower (80-400 km) ionosphere.

Remote Sensing - I am former principal investigator on a network of magnetometers owned by Quakefinder and deployed in California and still actively analyze the data. It consists of ten triaxial search-coil magnetometer systems measuring ultra low frequency (ULF), 0.001 - 16 Hz, magnetic field fluctuations. The network provides data for comprehensive multi-point measurements of specific events in the Pc1-Pc5 range at mid-latitudes as well as a systematic, long-term study of ULF signals in active fault regions in California

Robust Computing – In space, failures happen due to radiation and must be recovered from. We are investigating innovative techniques for building highly dependable distributed software systems emphasizing fast recovery rather than solely fault avoidance.

Publications

1. Bahcivan, H., M. C. Kelley, and J. W. Cutler (2009), Radar and rocket comparison of UHF radar scattering from auroral electrojet irregularities: Implications for a nanosatellite radar, J. Geophys. Res., 114, A06309, doi:10.1029/2009JA014132
2. Klesh, Andrew, S. Seagraves, M. Bennett, D. Boone, H. Bahcivan, J. Cutler, "Dynamically Driven Helmholtz Cage for Experimental Magnetic Attitude Determination," AAS/AIAA Astrodynamics Specialist Conference, 09-311, Pittsburgh, PA, 2009.
3. Bortnik, J., Cutler, J. W., Dunson, C., and Bleier, T. E.: The possible statistical relation of Pc1 pulsations to Earthquake occurrence at low latitudes, Ann. Geophys., 26, 2825-2836, 2008.
4. Cutler, J. W., J. Bortnik, C. Dunson, T. Bleier, J. Doering, CalMagNet - An Array of Search Coil Magnetometers Monitoring ULF Activity in California, Nat. Hazards Earth Syst. Sci., 8, 359-368, 2008.
5. Kalman, A., A. Reif, D. Berkenstock, J. Mann, J. Cutler, MISC™—A Novel Approach to Low–Cost Imaging Satellites, the 23rd Small Satellite Conference, Logan, Utah, 2008.

6. Bortnik J., J. W. Cutler, C. Dunson, T. E. Bleier, R. L. McPheron, Characteristics of low latitude Pc1 pulsations during geomagnetic storms, J. Geophys. Res., 113, A04201, doi:10.1029/2007JA012867.
7. Bortnik J., J. W. Cutler, C. Dunson, T. E. Bleier (2007), An automatic wave detection algorithm applied to Pc1 pulsations, J. Geophys. Res., 112, A04204, doi:10.1029/2006JA011900.
8. Chandler, G., D. McClure, S. Hishmeh, J. Lump, Jr., J Carter, B. Malphrus, D. Erb, W. Hutchinson, G. Strickler, J. Cutler. R. Twiggs, Development of an Off-the-Shelf Bus for Small Satellites, the 2007 IEEE Aerospace Conference, Big Sky, Montana, 10 March 2007, DOI: 10.1109/AERO.2007.352752.
9. Cutler, J., A. Fox, A Framework for Robust and Flexible Ground Station Networks, Journal of Aerospace Computing, Information, and Communication, 2006, vol.43 no.5 (73-92).
10. Swartwout, M., C. Kitts, J. Cutler, Sapphire: Case Study for Student-Built Spacecraft, Journal of Spacecraft and Rockets, Vol.3 No.3, pages 1136-1139, 2006.
11. Billet, O., W. Storck, M. Jambusaria, A. Sadhwani, P. Jammes, J. Cutler, A Survey of Micropropulsion for Small Satellites, In Proceedings of the 20th Annual Small Satellite Conference, Ogden, Utah, August, 2006.
12. Cutler, J., Ground Station Markup Language, in Proceedings of the 2004 IEEE Aerospace Conference, Big Sky, Montana, March, 2004.
13. Cutler, J., Ground Station Virtualization, in Proceedings of The Fifth International Symposium on Reducing the Cost of Spacecraft Ground Systems and Operations (RCSGSO), Pasadena, CA, July 8-11, 2003.
14. Candea, G., J. Cutler, A. Fox, Improving Availability with Recursive Micro-Reboots: A Soft-State System Case Study, in Performance Evaluation Journal, Summer 2003.
15. Cutler, J., P. Linder, A. Fox, A Federated Ground Station Network, in Proceedings of the SpaceOps 2002, Houston, Texas, October 2002.
16. Candea, G., J. Cutler, A. Fox, R. Doshi, P. Garg, R. Gowda, Reducing Recovery Time in a Small Recursively Restartable System**,** in Proceedings of the International Conference on Dependable Systems and Networks (DSN-2002), Washington, D.C., June 2002.
17. Patterson, D., A. Brown, P. Broadwell, G. Candea, M. Chen, J. Cutler, P. Enriquez, A. Fox, E. Kiciman, M. Merzbacher, D. Oppenheimer, N. Sastry, W. Tetzlaff, N. Treuhaft, Recovery Oriented Computing (ROC): Motivation, Definition, Techniques, and Case Studies, by D. Patterson, in UC Berkeley Computer Science Technical Report UCB/CSD-02-1175, Berkeley, CA, March 2002.
18. Cutler, J., A. Fox, K. Bhasin**,** Applying the Lessons of Internet Services to Space Systems**,** in Proceedings of the IEEE Aerospace Conference, Big Sky, Montana, March 9-16, 2002.
19. Cutler, J., G. Hutchins, C. Kitts, R. Twiggs, Infrastructure for Internet Based Operations in Proceedings of the 14th Annual Small Satellite Conference, Ogden, Utah, August, 2000.
20. Cutler, J., G. Hutchins, OPAL: Smaller, Simpler, and Just Plain Luckier in Proceedings of the 14th Annual Small Satellite Conference, Ogden, Utah, August, 2000.
21. Cutler, J., R. Twiggs, G. Hutchins, J. Williams, OPAL: A First Generation Microsatellite Providing Picosat Communications for the Amateur Radio Community, in Proceedings of the 1999 AMSAT-NA Symposium, San Diego, CA, October, 1999.

Presentations/Posters (Independent of publications)

1. Dontchev, Kiko, Andy Klesh, Matthew Bennett, James Cutler, In-Lab Testing for Attitude Determination and Control presented at the 2009 Summer Cubesat Workshop in Logan, Utah, August 2009.
2. Bennett, Matthew, Hasan Bahcivan, James Cutler, RAX - The Radio Aurora Explorer, presented at the 2009 Developer's Workshop in San Luis Obispo, CA, April 2009.
3. Cutler, J., D. Boone, Assessing Global Ground Station Capacity, Presented at the 2009 Cubesat Developers Workshop in San Luis Obispo, CA.

4. Mann, Julian, J. Cutler, Global Ground Station Survey, Presented at the 2008 Summer Cubesat Workshop in Logan, Utah.
5. Cutler, J., J. Bortnik, C. Dunson, J. Doering, T. Bleier, CalMagNet - an Array of Search Coil Magnetometers Monitoring ULF Activity in California, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract T31A-0434.
6. Dautermann, T., J. Cutler, E. Calais, C. Dunson, Comparison of GPS Integrated Electron Content Measurements with Electron Density Values acquired by the DEMETER Satellite in Japan, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract T31A-0425.
7. Bortnik, J., C. Dunson, J. Cutler, T. Bleier, Statistical analysis of ELF/VLF magnetic data from the DEMETER/IMSC instrument for large Earthquakes, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract T34B-07.
8. Bleier, T., J. Cutler, J. C. Dunson, J. Bortnik, E. Calais, T. Dautermann, M. Maniscalco, A Strategy for Collecting and Analyzing Multiple Electromagnetic (EM) Data Sets for Pre- Earthquake Signal Investigations, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract T31A-0439.
9. Ford, C., J. Bortnik, J. Cutler, C. Dunson, T. Bleier, An automatic wave detection algorithm applied to Pc1 pulsations in California, and results of a 6-year statistical survey, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract SM43D-06.
10. Dunson, J. C., J. Doering, T. Bleier, J. Cutler, J. Bortnik, ULF Pc 3-4 Pulsations: Observations, Processing, and Characterization in the California Region, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract SM43D-06.
11. Bortnik J., C. Dunson, J. W. Cutler, and T. E. Bleier, Comparison of ELF/VLF magnetic data from the DEMETER/IMSC instrument for large earthquakes with and without preseismic activity, International Symposium DEMETER, Toulouse, France, June 14-16, 2006.
12. Bortnik J., J.W. Cutler, C. Dunson, and T. Bleier, Observations of residual ULF signals from the Parkfield magnetometer surrounding large earthquakes, Eos Trans. AGU, 86 (52), Fall Meet. Suppl., Abstract T51B-1344, Dec. 2005.
13. Cutler, J., A Data Fusion Center For the Seismo-Electromagnetic Community, presented the 3rd Annual Meeting of GEON, San Diego, CA, May, 2005.
14. Cutler, J., Global CubeSat Operations, CubeSat Developers Workshop, San Luis Obispo, CA, April 2004.
15. Cutler, J., Flexible Application Support in Ground Stations, Ground Systems Architecture Workshop (GSAW) 2004, Manhattan Beach, CA. March 2004.
16. Cutler, J., Recovery-Oriented Ground Systems, Ground Systems Architecture Workshop (GSAW) 2003, Manhattan Beach, CA. March 2003.
17. Cutler, J., Invited Speaker and Lecturer, Norwegian CubeSat Workshop. Provided tutorials and consulting on small satellite design and development to Norwegian universities building CubeSats, Sept. 2002.
18. Cutler, J., IP Infrastructure for Space Systems, NASA Space Communications Symposium, Cleveland, Ohio, September 2002.
19. Cutler, J., Applying the Lessons of Internet Services to Space Systems, Ground Systems Architecture Workshop (GSAW) 2002, Redondo Beach, CA. March 2002.
20. Cutler, J., Applying the Lessons of Internet Services to Space Systems, Space Internet Workshop 2002, Greenbelt, MD. March 2002.
21. Cutler, J., Applying the Lessons of Internet Services to Space Communication Systems, High Rate Data Delivery Workshop**,** Cleveland, Ohio. August 2001.
22. Cutler, J. Testbed for Internet-Based Operations, Space Internet Workshop 2000, Greenbelt, MD, 2000.

Related Work Experience

University of Michigan—Department of Aerospace Engineering; *Ann Arbor, MI*
Assistant Professor: August 2008 – Present
Researcher and lecturer dedicated to the advancement of space system capability.

Stanford University—Department of Aeronautics and Astronautics; *Stanford, CA*
Consulting Professor: June 2005 – August 2008
Researcher and lecturer in the Space and Systems Development Laboratory, which was dedicated to the advancement of space technology and training of the next generation of space engineers.

QuakeFinder,LLC; *Palo Alto, CA*
Research Scientist/Spacecraft Designer: Jan 2002 – August 2008
Research scientist and systems engineer for a small research company studying electromagnetic activity in active earthquake regions.

Lockheed Martin Corporation; *Sunnyvale, CA`*
Research engineer: June 2001 – October 2002
Developed infrastructure to support distributed computing experiments by integrating STK, Matlab, and a network simulator to simulate satellite cluster communications.

Stanford Academic Computing; *Stanford University, CA*
Residential Computing Consultant: May 1999 – September 2003
Served as a residential computing consultant in graduate student university housing. Educated residents on computing at Stanford, consulted on computer problems, and supported in-room network connections.

Relevant Skills and Abilities

- Computer related: extensive programming (C, PHP, Perl, Java, shell scripts), Matlab development, Linux installation and administration, virtual machines (VMware), Apache/MYSQL/PHP system administration, Mambo development, web server development.
- Circuit design, schematic entry, and PCB layout.
- Public speaking for small or large audiences.
- Professional writing for journals and magazines.
- Operational flight experience with high altitude balloon flights and tracking.

Professional Activities

- Program Committee member of Ground Systems Architecture Workshop (GSAW) 2003-2005, annual workshop to discuss architecture and design of space ground systems.
- Technical reviewer for NASA NRA's including NASA Glenn Research Center's Computing, Information and Communications Technology Program (CICT), Space Communication Project, 2002, and NASA ROSES 2005 Earth and Surface Interior.
- Technical reviewer for the IEEE Transactions on Aerospace and Electronic Systems, 2004-present.
- Director of the Mercury Ground Station Network, a federation of networked ground stations supporting university satellite missions. The initial beta test team consists of Stanford University (Prof Robert Twiggs), Julius-Maximilians Universitat Würzburg in Germany (Prof. Klaus Schilling), Norwegian University of Science and Technology (Dr. Egil Eide), California Polytechnic State University (Prof. Jordi Puig-Suari), Aalborg University in Denmark.
- Technical reviewer for Natural Sciences and Engineering Research Council of Canada (NSERC).

Professional Distinctions

- 2006/2008: Stanford AIAA Award For Excellence in Teaching