

CURRICULUM VITAE
Kyle J. Bunch, PhD, PE
Senior Engineer
RAND Corporation
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EDUCATION

Ph.D. E.E. University of Utah, Salt Lake City UT (84112), graduated with honors
D.E.E. University of Utah
M.E.E.E. University of Utah
B.S. Dual major in Computer Science and Electrical Engineering, University of Colorado, Boulder, CO (80309)

LICENSING

- Registered Professional Engineer in the state of New Mexico (#17146), active
- Certified Ethical Hacker (EC-Council #ECC49258026060)

PROFESSIONAL EXPERIENCE

Senior Engineer

RAND Corporation, February 2020-Present

- Researcher in the convergence of technology and policy

Technical Consultant/SME to the Defense Advanced Research Projects Agency (DARPA)

Booz-Allen Hamilton, June 2015-January 2020

- S&T consultant to Microsystems Technology Office of DARPA
- Leading new program development in advanced micro-fabricated systems in support of DARPA Program Managers
- Primary technical lead/SME for major DARPA advanced radar program (\$45M, Arrays at Commercial Timescales, ACT)
 - Advanced digital radar program to replace analog solutions with flexible, high performance, programmable phased array modules ("Common Module")—designed for adaptable radar in contested RF spectral environment.
 - Interacting with multiple services and laboratories to ensure successful technology transition including ARL, AFRL, MIT Lincoln Labs, John Hopkins APL, ONR
 - Successfully led offshoot development for AFRL unmanned pod radar demonstration
 - Interacted with multiple agencies to provide ACT-related messaging including OSD, Air Force Air Combatant Commands, Navy Integrated Warfare Systems (PEO IWS)
 - Co-chaired conference sessions:
 - Co-Chair, Government Microcircuit Applications and Critical Technology Conference (GOMAC), two sessions of, "Signal Processing at R.F.," March 12, 2018.
 - Co-authored conference proceedings:
 - R.H. Olsson, K.J. Bunch, C. Gordon, R. Bogoslovov, B. Epstein, "Signal Processing at R.F. (SPAR): An Overview, in Government Microcircuit

- Applications and Critical Technology Conference (GOMAC), March 12-15, Miami, FL, 2018.
 - R.H. Olsson, K.J. Bunch, C. Gordon, "Reconfigurable Electronics for Adaptive RF Systems," in IEEE Compound Semiconductor IC Symposium (CSIC), October 23-26, Austin, TX, 2016.
 - R.H. Olsson, K.J. Bunch, C. Gordon, N. Zhou, "Creating a Universal Radio Frequency Front-End for Elemental Digital Beam Formed Phased Arrays," in IEEE International Symposium on Phased Array Systems & Technology, October 18-21, Waltham, MA, 2016.
 - R. Olsson, K.J. Bunch, "Arrays at Commercial Timescales: An Overview of the DARPA ACT Program," Government Microcircuit Applications and Critical Technology Conference (GOMAC), March 14-17, 2016, Orlando, FL.
- Primary technical lead/SME for Signal Processing at RF (\$35M, SPAR)
 - Analog RF processing technology development for communication in challenged spectral environment
 - Collaborated in concept development, program generation, and funding acquisition.
 - Performed simulations in Matlab/Simulink to determine viability of new concepts submitted from external researchers
 - Xo-chair on upcoming SPAR session in Government Microcircuit Applications & Critical Technology Conference (GOMAC)
 - Providing messaging for eventual transition to DoD clients
- Technical SME for A Mechanical Based Antenna (AMEBA)
 - Extremely low frequency communications using mechanically-driven source generation
 - Providing technical guidance and feedback for novel performer solutions in mechanics, electromagnetics, coupled-physical domain problems involving piezoelectric/magnetostrictive materials, nano-ferrofluids, and coupled electromechanical oscillators
- Primary technical lead for new DARPA program, Foundations for Novel Compute (\$40M, FRANC)
 - Technical thrust under larger DARPA program to develop new technologies for a new Moore's law path—Materials & Integration Thrust
 - Co-developed program justification and BAA
 - Pitched program to office leadership
 - Led process from proposal to contracting

Expert Consultant

*United States Department of State, Bureau of Counterterrorism (CT), Technical Programs
Washington, DC, November 2014-February 2015*

Senior Science Advisor to the State Department in the areas of

- National Security and Foreign Policy
- Arms Control and verification technologies
- Counterterrorism
- Countering Improvised Explosive Devices
- Counter tunnel technologies

Senior Science Advisor

*United States Department of State, Bureau of Counterterrorism (CT), Technical Programs
Washington, DC, November 2013-November 2014*

- **Subject matter expert and broad area science and technology (S&T) advisor to the U.S. Department of State (DOS)** for the development of novel technology and approaches to counter terrorism.
- **Served as S&T advisor for DOS in multiple strategic committees and working groups** to determine technical approaches and R&D funding priorities

- **Interagency Tunnel Working Group**—DOS S&T representative for DoD-led working group to detect and counter criminal and terrorist use of tunnels.
 - Provided overseas facility protection scenarios
 - Collaborating in defining promising technologies in
 - Tunnel signature detection
 - Optical/acoustic sensing method
 - Ground penetrating radar and low-frequency electromagnetics
 - System level/algorithmic approaches to counter false positives
- **Science and Technology subcommittee for Countering Explosives Devices**—DOS S&T representative for White House subcommittee under the National Science and Technology Council (NSTC)
 - Provided advice for mid and long term R&D funding to address gaps within U.S. interagency community including technical areas of
 - Submillimeter-wave image scanning and processing methods
 - Hardware/networking and software to process images and perform threat detection at airports and embassies
 - Development of submillimeter-wave sensors, specialized digital signal processors
 - Raman spectroscopy and miniature mass spectrometer sensors for explosives detection
 - Low field magnetic resonance imaging technologies
 - Neutron scattering technologies
- **JPO C-IED (Joint Program Office for Countering-Improvised Explosive Devices) Implementation Committees**—Served as DOS S&T and policy representative to define approaches to counter terrorist use of explosive devices.
 - Served as co-chair (with DHS Office of Bombing Prevention) for COE working group
 - Worked with DOS/Anti-Terrorism Assistance (ATA), International Law enforcement and Narcotics (INL), Diplomatic Security (DS) to determine DOS budget gaps in technology development for reporting to the National Security Council (NSC).
- **Technical Support Working Group (TSWG)**—Co-chaired by CT/Technical Programs; interagency funding vehicle for technologies to counter terrorism.
 - Served as DOS S&T representative to define priority areas of funding
 - Revised Broad Agency Announcement (BAA) to include DOS interests
 - Participated in TSWG-funded Interagency Forensic Summit to define priority areas of development for forensics science.
 - Served as technical reviewer for proposals submitted under TSWG BAA
- **Participated on National Science Foundation review panel for Electrical, Communications and Cyber Systems (ECCS) research proposals**
 - Advanced simulation methods of optical and photonic systems
 - Additive manufacturing and rapid prototype technologies
 - Novel metamaterial configurations and applications
 - Novel sensor approaches

IEEE-USA Diplomacy and Engineering Fellow/AAAS Fellow

United States Department of State, Arms Control, Verification and Compliance Bureau, Office of Verification and Transparency Technologies

Washington, DC, November 2012- November 2013

- **Science and Technical Advisor to the U.S. Department of State** under Institute of Electrical and Electronic (IEEE)/American Institute for the Advancement of Science (AAAS) fellowship.
- **Technical Liaison to Academia, National Laboratories and other Government agencies** to bring relevant technologies supporting U.S. arms control verification needs for present and future treaties.
 - Lectured to Pennsylvania State University's Engineering Science and Mechanics

- department as well as George Mason's Engineering department on engineering in arms control
 - o Served as State Department lead to multidisciplinary project in social media (twitter) analysis with Texas A&M University for measuring transparency and veracity in public reporting
- **Contributed to Bureau needs document broadly defining future and leading edge technologies** needed across the USG for verifying compliance in nuclear, biological, chemical and conventional arms treaties.
- **Collaborated with various government research agencies** (DARPA, IARPA, NSF, ONR-Global, OSTP) and hosted visits to find overlapping needs and cross-funding opportunities.
 - o Created DARPA overlap needs document and hosted DARPA program manager
 - o Hosted ONR Global for determining cross-funding potential
- **Served as technical reviewer on various broad agency review panels**
 - o Areas of review included
 - Radiation and chemical sensor technologies
 - Social and network analytic analysis
 - Internet of things and distributed sensors
 - Novel electromagnetic and acoustic interrogation methods
 - o Reviewer for National Nuclear Security Administration (NNSA), Office of Proliferation Detection (NA221)
 - o Reviewer for three funding cycles of State department's "V-fund"
 - o Reviewer for 2013 "Innovation in Arms Control Challenge" managed through Innocentive
- **Performed research in cryptological, quantum information, electromagnetic methods for use in nuclear weapons inspection scenarios**
 - o Presented at 2013 International Nuclear Materials Management conference on the use of homomorphic encryption for implementing nuclear inspection information barriers
 - o Worked with Oak Ridge National Laboratory to define information protection process for nuclear weapons inspections based on quantum information processing
 - o Published in Journal of Science and Global Security

Senior Research and Development Scientist

Pacific Northwest National Laboratory (Battelle), Richland, WA, 2006-2012.

- **Applied research scientist and engineer** developing technologies to support national security and defense
 - o Multiphysics simulation using Matlab, HFSS, Maxwell, Labview and Comsol
 - o Scientific programming and analysis
 - o Electrical grid and power system analysis, security and protection
 - o RF and Communication
 - o Optics and Metamaterials
 - o RF imaging and data analysis
- **Developed business opportunities** through interaction with wide client base including private and government entities for developing engineering research projects
- **Successfully attracted new research** and led/participated in teams of technical experts in various disciplines (selected):
 - o *K.J. Bunch, PI, A.M. Jones, PI*, "Low Frequency Electromagnetic Interrogation Techniques for Container Content Signature Detection," Funded. FY 2010 Laboratory Directed Research and Development, PNNL, \$350K.
 - o *K.J. Bunch, PM, PI*, "Development of a Ballistic Electron Microfabricated Cathode" Funded. FY08 Laboratory Directed Research and Development, PNNL, \$240k.
 - o *K.J. Bunch, PM, PI*, "Fabrication of a Carbon Nanotube Thermionic Cathode," funded as user facility proposal, at the Environmental and Molecular Sciences Laboratory (EMSL), Pacific Northwest National Laboratory.
 - o *K.J. Bunch*, "Fabrication of a Carbon Nanotube Thermionic Cathode," funded as user facility proposal, Center for Nanophase Materials Sciences (CNMS), Oak Ridge National Laboratory.

- *D. Puzycki, PM, K.J. Bunch, PI*, "Electronic Emulation System," NA42, Render Safe R&D Program, \$150K.
- **Published research** in journals/reports/conference proceedings (selected):
 - *K.J. Bunch, D.L. McMakin, D.M. Sheen*, "Wideband Fractal Antennas for Holographic Imaging and Rectenna Applications," Proceedings of the SPIE. Vol. 6948, 2008.
 - *K.J. Bunch, LS Williams, AM Jones, P. Ramuhalli*, "Electromagnetic Signature Technique as a Promising Tool to Verify Nuclear Weapons Storage and Dismantlement under a Nuclear Arms Control Regime," Conference Proceedings, International Materials Management, 53rd annual meeting, Orland, FL, July 2012.
 - *K.J. Bunch*, "Penetration of an Applied Electromagnetic Pulse into a Metallic Enclosure," Report PNNL-19087, Dec. 2009.
 - *K.J. Bunch*, "Shielding against a High-Altitude Nuclear-Induced Electromagnetic Pulse--Simulations on a Sample Structure, Report PNNL- 19188, Feb. 2010.
- **Filed technical advances and granted patents**
 - *K.J. Bunch, D.L McMakin*, "Holographic Imaging Based on Time-Domain Data of Natural-Fiber-Containing Materials," US Patent No. 8,258,995, September, 2012.
 - *K.J. Bunch, B. Tucker. R. Severtsen, T. Hall, D. McMakin, R. Harris, W. Lechelt, J. Griffin*, "Holographic Imaging of Natural-Fiber-Containing Materials," US Patent No. 7,855,673 December 21, 2010.
 - *M. Watkins and K.J. Bunch*, "Method and means to determine moisture content of wood products during processing," June 2007.
 - *K.J. Bunch, T. Hall, R. Harris, D. McMakin, R. Severtsen, B. Tucker*, "Moisture measurement using microwave holographic imaging methods," September 2007.
 - *K.J. Bunch, R. Pratt, D. Puzycki, R. Slauch*, "Cell phone detection method," September 2007.
 - *K.J. Bunch*, "Carbon nanotube terahertz tag," November 2007.
 - *K.J. Bunch, D. McMakin, D. Sheen*, "Fractal antennas for harmonic radar," February 2008.
- **Served on technical committees**
 - Corresponding Member, IEEE-USA Energy Policy Committee
 - Publications Chair for the IEEE 2008 international Nanotechnology Conference, August 18-21, 2008, Arlington, TX.

Member of the Technical Staff

Sandia National Laboratories, Albuquerque, NM, 2004-2006

- **Engineer in Advanced Fusing Technologies** group
- **Developed new concepts** for high current, high voltage vacuum microelectronic switch devices
- **Developed ultra high vacuum test and modeling system** for characterizing advanced switching concepts
- **Performed electromagnetic simulations** for vacuum switch design
- **Developed proposals** for laboratory directed research (LDRD)
 - "Investigation into Current and Phase Discriminating Methods for Detection and Characterization of Ground-Penetrating Missiles"
 - "Development of a Ballistic Electron Microfabricated Cathode for Vacuum Microelectronic Applications"
 - "Development of Theoretical and Numerical Modeling for Next-Generation Vacuum Microelectronic Devices"
 - "Microfabricated, Tunable Millimeter-Wave Source for Explosives Detection Spectroscopy"
- **Served as co-PI** on LDRD to advance vacuum switch development for nuclear weapons (\$750K); successfully created first of kind functioning vacuum microelectronic prototype.
- **Filed technical advances and received patent**

- AW Roesler, JM Schare, KJ Bunch, "Microfabricated Triggered Vacuum Switch," US Patent No. 7,714,240, May 11, 2010.
- KJ Bunch, et al., "Low Temperature Cofired Ceramic Vacuum Switch", May 2006.
- KJ Bunch and AW Roesler, "A Thermionic Carbon Nanotube Emitter, Feb. 2005.
- KJ Bunch, "A Method to Detect Missile Ground Penetration," Mar. 2005.
- KJ Bunch, AW Roesler, "A Vacuum Switch Using an Electronic Breakdown Process," Jan. 2005.

President and Owner

DrKyle, LLC, Salt Lake City, UT, 1997-2004

- **Consulting firm** involved in engineering simulation and modeling, software development and design, project development, proposal creation, venture capital attraction.
- **Evaluated novel magnetically-based torque converter and generator** for venture capital group. Defined test system, performed measurements, determined project feasibility
- **Developed and pursued funding** for novel high-efficiency electric motor (XiDEM). Landed \$2 Million NIST contract.
- **Developed database driven technologies** for information verification in the areas of banking and consumer email.
- **Developed initial desktop interface** for consumer media server (Axonix MediaMax).
- **Pursued various patents** on electronic information verification and control.
 - *J. Benowitz and KJ Bunch*, "Technology enhanced communication authorization system," US Patent Application No. 10/465,245, June 19, 2003.
 - *J. Benowitz and K.J. Bunch*, "Using a Networked Verification System to Verify the Existence and Accuracy of Data," 2002.

Director of Systems Engineering

XiDEM Corporation, Draper, UT, 2001- 2003

- **Principal Investigator and Lead project engineer** responsible for the next-stage design of an advanced electric motor for use in electric vehicles.
- **Attracted \$ 2 Million of ATP (Advanced Technology Program, NIST) funding** for prototype development.
- **Served as Principal Investigator for grant;** supervised engineers in the advancement of technology development for electric vehicle and energy sectors.
- **Successfully designed, built and tested** full-scale 150kW electric motor/generator based on patented concept.
- **Selected complex tools, hardware and software** to redesign motor configuration to improve performance by 3 x. Filed for patents on new designs.
- **Used advanced finite-element electromagnetic tools** (Ansoft Optimetrics and Maxwell 3D) to optimize motor magnetics and project motor performance.
- **Designed initial power drive and regeneration electronics.** Used Ansoft's multi-technology Simplorer to verify design operation. Created novel PWM ladder design for dual purposes of power generation and regeneration.
- **Designed and directed complex laboratory experiments** using a sophisticated motor/generator model system. Evaluated and projected losses relating to magnetics (eddy current and hysteresis), circuit influences, and wiring to determine expected performance over a wide range of operating conditions.
- **Frequently presented to venture capitalists** to continue funding of company technology.

Research Assistant Professor

University of Utah, Salt Lake City, 1991-2002

- **Researcher in the areas of electromagnetics, metamaterials, and theoretical modeling of novel concepts for high frequency device physics.**
 - **Wrote electromagnetic simulation software** to model interdigital line for

- use in a Terahertz-range backward wave oscillator
- **Developed boundary residual methods** for full wave analysis of generalized electromagnetic structures with particular application to periodic systems
- **Developed electromagnetic inverse-scattering models** with applications to the microwave imaging and characterization of underground scatterers
- **Researched advanced applications** for high temperature superconductors for use in active superconducting traveling-wave devices
- **Researched the exploitation of ballistic electrons in semiconductors** to create a solid state cathode for use in flat-panel displays, electron lithography, and high-powered switch devices. Received broad patent for concept.
- **Taught courses** in various undergraduate/graduate areas:
 - *Basic Digital Design*—Simple logic circuits to synchronous/asynchronous state machines; included laboratory
 - *Computational Electromagnetics*—Various techniques for computing various electromagnetic applications including antenna design, FDTD simulations, Method of Moments
 - *Electric Circuit Analysis*—Basic analysis of electric circuits for non-electrical engineering majors; included laboratory
 - *Microwave Device Operation*—Operation of microwave devices including traveling wave tubes, magnetrons, gyrotrons, etc.
 - *Electric Machinery*—Operation of basic electric machines including induction motors, reluctance motors, permanent magnet motors, and associated drive electronics
 - *Graduate Electromagnetism*—Advanced analysis of various electromagnetic problems including wave propagation, scattering, field matching, etc.
- **Supervised design projects for industry sponsors** under undergraduate team capstone programs

Visiting Professor under a Fulbright Fellowship

Technical University of Lodz, Poland, 1993-1994 Academic Year

- Taught seminar courses in logic design and windows applications
- Taught course to faculty on techniques in EM field calculations
- Lectured in EMI and electromagnetic coupling in high-speed digital circuitry
- Assisted in student exchange program between Poland and Russia
- Lectured at various universities in Poland and Russia
- Served as a liaison to develop faculty and faculty opportunities

TRAINING

- *Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization*, Coursera course taught by Andrew Ng, Certificate SVYFFWJF8PML, 2019.
- *Neural Networks and Deep Learning*, Coursera course taught by Andrew Ng, Certificate TDV4C3D6PHBX, 2019.
- *Structuring Machine Learning Projects*, Coursera course taught by Andrew Ng, Certificate MBEEQB7JUL6L, 2019.
- *Understanding the Interagency*, US Department of State Foreign Service Institute, April 4-7, 2014.
- *International Negotiation: Art and Skills*, US Department of State Foreign Service Institute, Sept 9-16, 2013.
- *Cryptography I*, Coursera course taught by Stanford Professor Dan Boneh, June 17 (6 weeks).
- *7 Habits of Highly Effective People*, US Department of State Foreign Service Institute, July 9-12, 2013.
- *Communicating with Congress: Briefing and Testifying*, US Department of State Foreign Service Institute, June 26-27, 2013.
- *Intelligence and Foreign Policy*, US Department of State Foreign Service Institute, May 20-22, 2013.
- *Foundations of International Law*, US Department of State Foreign Service Institute, May 15-17, 2013.

- *Introductory Negotiation*, US Department of State Foreign Service Institute, May 1-3, 2013.
- *Washington Tradecraft*, US Department of State Foreign Service Institute, Feb 26-March 1, 2013.
- *Negotiation 101: Workplace Negotiation Skills to Yield Better Results*, held at the American Association for the Advancement of Science (AAAS), Washington, DC, March 8, 2013.
- *Managing Time and Making it all Work*, David Allen, held at the American Association for the Advancement of Science (AAAS), Washington, DC, Feb 7, 2013.
- *Media Skills for a Lifetime*, held at the American Association for the Advancement of Science (AAAS), Washington, DC, Jan 9, 2013.
- *Nuclear Arms Control and Nonproliferation Class*, Pacific Northwest National Laboratory, class/workshop, May 2011-September 2012.
- *Power System Grounding and Electromagnetic Interference*, Safe Engineering Services and Technologies, Ltd (SESTECH), May 9-13, 2011, Montreal, Canada
- *Ridley Engineering Power Supply Design Workshop*, June 6-9, 2010, Atlanta, GA
- *Gas Centrifuge Technology Course*, Office of Intelligence and Counterintelligence, Department of Energy, Oct. 26-28, 2010, Richland, WA
- *AC/DC Modeling, RF Modeling, Multiphysics Modeling*, COMSOL training and user conference, Oct 13-15, 2007, Boston, MA.
- *Antennas for Wireless Communications: Basic Principles and System Applications*, Dr. Warren Stutzman (Virginia Tech), Instructor, Antennas Systems and Technology, Sept. 24, 2007, Denver, CO.
- *Nanomechanics*, Sandia National Laboratories, July 10-12, 2006, Albuquerque, NM
- *Vacuum Leak Detection*, American Vacuum Society, May 25, 2006, Albuquerque, NM
- *Operation & Maintenance of Vacuum Pumping Systems*, American Vacuum Society, May 23-24, 2006, Albuquerque, NM
- *Extraordinary Performer*, Workshop conducted by Zenger/Folkman, Feb. 2, 2006, Albuquerque, NM
- *Strategic Project Management Workshop*, Centre for Strategic Management, Jan. 31-Feb. 1, 2006, Albuquerque, NM
- *Orange Belt Project Management Certification*, International Institute for Learning, Nov. 14-15, 2005, Albuquerque, NM
- *Nuclear Weapons 101*, Sandia National Laboratories, November 2004-March 2005, Albuquerque, NM
- *Electric Motor Design*, Ansoft Maxwell training seminar, Sept. 26-28, 2001, Pittsburgh, PA.

FELLOWSHIPS

- IEEE Engineering and Diplomacy Fellowship, US Department of State, 2012-2014.
- Fulbright Fellowship, 1993-1994 Academic Year, Technical University of Lodz, Poland
- Air Force Thermionic Engineering Research Program. This program was jointly sponsored by industry and the Air Force.
- TRW Masters Fellowship. This was a half-time fellowship awarded while working for TRW in Colorado Springs, Co., 1983.
- Full appointment to the U.S. Military Academy at West Point, 1978
- Air Force ROTC Scholarship, 1978
- Army ROTC Scholarship, 1978
- Regent Scholarship, University of Colorado, 1978

JOURNAL/CONFERENCE PAPERS

- *B. Epstein, R.H. Olsson, K.J. Bunch*, "Arrays at Commercial Timescales: Addressing the Development and Upgrade Costs of Phased Arrays," in Proceedings of the IEEE Radar Conference (RADARCON), 23-27 March, Oklahoma City, OK, 2018.
- *R.H. Olsson, K.J. Bunch, C. Gordon, R. Bogoslovov, B. Epstein*, "Signal Processing at RF: An Overview," in proceedings of the Government Microcircuit Applications & Critical Technology Conference (GOMAC), March 12-15, Miami, FL, 2018.
- *R.H. Olsson, K.J. Bunch, C. Gordon, N. Zhou*, "Creating a Universal Radio Frequency Front-End for Elemental Digital Beam Formed Phased Arrays," in Proceedings of the IEEE

International Symposium on Phased Array Systems and Technology (PAST), 18-21 Oct., Waltham, MA, 2016.

- *R.H. Olsson, K.J. Bunch, C. Gordon*, "Reconfigurable Electronics for Adaptive RF Systems," in Proceedings of the IEEE Compound Semiconductor IC Symposium (CSIC), October 23-26, Austin, TX, 2016.
- *KJ Bunch*, "Homomorphic Encryption Combined with Configurable Computing for Potential Use in Information Barriers," submitted to Science and Global Security, 2014.
- *KJ Bunch, M. Jones, P. Ramuhalli, J. Benz, L.S. Denlinger*, "Supporting Technology for Chain of Custody of Nuclear Weapons and Materials throughout the Dismantlement and Disposition Processes," *Science & Global Security*, vol. 22, no. 2, 2014, pp. 111-134.
- *KJ Bunch*, "Approaches for modeling electron beam/electromagnetic interaction and their connection to distributed feedback lasers," *SPIE Journal of Nanophotonics*, Vol. 7, No. 1, November 2013.
- *KJ Bunch*, "The Use of Homomorphic Encryption Methods Combined with Field Programmable Gate Array Hardware for Information Barrier Design," Conference Proceedings, International Materials Management, 54th annual meeting, Palm Desert, CA, July 2013.
- *AM Jones, KJ Bunch, PM Aker*, "Simulation and Experimental Validation of Electromagnetic Signatures for Monitoring of Nuclear Material Storage Containers," *Journal of the Institute of Nuclear Materials Management*, Vol. 16, No. 2, 2013, pp. 4-13.
- *KJ Bunch, LS Williams, AM Jones, P. Ramuhalli*, "Electromagnetic Signature Technique as a Promising Tool to Verify Nuclear Weapons Storage and Dismantlement under a Nuclear Arms Control Regime," Conference Proceedings, International Materials Management, 53rd annual meeting, Orlando, FL, July 2012.
- *K.J. Bunch, D.L. McMakin, D.M. Sheen*, "Wideband Fractal Antennas for Holographic Imaging and Rectenna Applications," *Proceedings of the SPIE*. Vol. 6948, 2008.
- *LJ Bond, SR Doctor, KJ Bunch, MS Good, and AE Waltar*, "Instrumentation, Monitoring and NDE for New Fast Reactors," *Proceedings, GLOBAL 2007, Advanced Nuclear Fuel Cycles and Systems*, Boise, ID, September 9-13, 2007, Am. Nuclear Soc. pp. 1274-1279.
- *A.F. Pardini, L.J. Bond, M.S. Good, K.J. Bunch, G.J. Sandness, R.L. Hockey, J.J. Saurwein, J.N. Gray*, "On-line nondestructive methods for examining fuel particles", *Proceedings, GLOBAL 2007, Advanced Nuclear Fuel Cycles and Systems*, Boise, ID, September 9-13, 2007, Am. Nuclear Soc. pp 25-36.
- *K.J. Bunch and J. Bailey*, "A Novel Digital Electric Motor for use in Electrical Vehicles," *Proceedings of the 16th Symposium of the Department of General Electrotechnics*, Technical University of Lodz, May 11-13, 2001, pp. 51-55.
- *K.J. Bunch and R.W. Grow*, "An Investigation into Density-Wave Propagation Within High-Temperature Superconducting Plasmas for Use in Creating Traveling-Wave Devices," *International Journal of Infrared and Millimeter Waves*, Vol. 18 No. 1, January 1997, p. 57.
- *S.A. Johnson, D.T. Borup, J.W. Wiskin, M J. Berggren, M.S. Zhdanov, K.J. Bunch, and R. Eidens*, "Application of Inverse Scattering and Other Refraction Corrected Methods to Environmental Imaging with Acoustic or Electromagnetic Energy, Next Generation Environmental Models and Computational Methods, Society for Industrial and Applied Mathematics, G. Delic and M.F. Wheeler, editors, 1997, Chapter 31, pp. 295-312.
- *K.J. Bunch and R.W. Grow*, "An Extrapolation Technique to Iterate to the Smallest and Largest Eigenvalues of an Infinite-Dimensional Normal Matrix Used in Function Fitting," *Applied Mathematics and Computation*, Vol. 62, No. 1, April 1994, pp. 17-27.
- *K.J. Bunch and R.W. Grow*, "A Difference Equation Model of Partial Series," *Applied Mathematics and Computation*, Vol. 61, Nos. 1 and 2, March 15, 1994, pp. 301-305.
- *K.J. Bunch and R.W. Grow*, "Cavity Resonances by the Boundary-Residual Method versus Experiment," *International Journal of Electronics*, Vol.. 72, Nos. 5 and 6, pp. 841-849, 1992.
- *K.J. Bunch and R.W. Grow*, "On the Convergence of the Method of Moments, the Boundary-Residual Method and the point-Matching Method with a Rigorously Convergent Formulation of the Point-Matching Method," *Journal of the Applied Computational Electromagnetics Society*, Vol 8, No. 2, 1993, 188-202.
- *K.J. Bunch and R.W. Grow*, "Transform Methods to Test the Validity of Using Nonlinear Extrapolation and a Justification for Its Use on Fourier Series," *Journal of Electromagnetic*

Waves and Applications, Vol. 7, No. 2, pp. 263-283, 1993.

- *K.J. Bunch and R.W. Grow*, "A Unified Approach to the Effects of Symmetry and Periodicity on Boundary-Value Problems," *International Journal of Infrared and Millimeter Waves*, Vol. 13, No. 2, February 1992, pp. 229-250.
- *K.J. Bunch and R.W. Grow*, "The Use of Extrapolation for Calculating Elementary Transcendental and Bessel Functions," *Applied Mathematics Letters*, Vol. 5, No. 1, January 1992, pp. 31-37.
- *K.J. Bunch, W.N. Cain and R.W. Grow*, "The Z-Transform method of Evaluating Partial Summations in Closed Form," *Journal of Physics A: Mathematical and General*, Vol. 23, 1990, pp. L1213-L1215.
- *K.J. Bunch and R.W. Grow*, "A Compact Cubic Spline Algorithm for Converging to Function Minimums," *Applied Mathematics and Computation*, Vol. 56, No. 1, June 1993, pp. 29-34.
- *J. Newman, L. Walsh, R. Evans, T. Tholen, O.M. Andrade, K.J. Bunch, M.F. Iskander, H. Kimrey*, "Experimental Validation of Numerical Simulations of the Microwave Sintering Process," *Ceramic Transactions on Microwaves: Theory and Applications in Materials Processing II*, D. Clark, W. Tinga, and J. Laia, Eds., Vol. 36, 1993, pp. 229-237.
- *K.J. Bunch and R.W. Grow*, "The Cylindrical Waveguide with Sinusoidally Perturbed Walls for High-Power Gyrotron Applications," *Conference Digest, The Fifteenth International Conference on Infrared and Millimeter Waves*, Orlando, Florida, December 10-14, 1990, pp. 313-314.
- *K.J. Bunch and R.W. Grow*, "Self Consistent Field Calculations on Diatomic Hydrogen in a Potential Well," *Fusion Technology*, Vol 19, No. 4, July 1991, pp. 2131-2134.
- *K.J. Bunch and R.W. Grow*, "A Simple Method to Generate Test Matrices of Known Eigenvalue or Singular Value Spectra," *Computers and Mathematics with Applications*, Vol. 22, No. 7, 1991, pp.65-67.
- *K.J. Bunch and R.W. Grow*, "A Data Fitting Approach to Series Convergence Acceleration," *Applied Mathematics and Computation*, Vol. 42, No. 2, March 1991, pp. 189-195.
- *K.J. Bunch, W.N. Cain, and R.W. Grow*, "The Use of Extrapolation on Wave Expansions to Force the Satisfaction of the Rayleigh Hypothesis," *Journal of the Optical Society of America A*, Vol. 9, No. 5, May 1992, pp. 755-764.
- *K.J. Bunch and R.W. Grow*, "Numerical Aspects to Solving EM Field Problems in Millimeter-Wave Devices Using Boundary Residual Methods," *Conference Digest, The Fourteenth International Conference on Infrared and Millimeter Waves*, Wurzburg, Germany, October 2-6, 1989, pp. 168-169.
- *K.J. Bunch and R.W. Grow*, "Numerical Aspects of the Boundary Residual Method," *International Journal of Numerical Modeling*, March 1990, pp. 57-71.
- *K.J. Bunch and R.W. Grow*, "A Technique to Shift and Eigenvalue of a Complex Matrix to Accelerate Convergence of the Power and Inverse Power Method," *Computers and Mathematics with Applications*, Vol. 21, no. 4, 1991, pp. 11-16.
- *K.J. Bunch and R.W. Grow*, "Electric-Field Distribution of the Palladium Crystal Lattice," *First Annual Conference on Cold Fusion*, *Conference Proceedings*, pp. 243-249, March 1990.
- *K.J. Bunch and R. W. Grow*, "The Boundary-Residual Method for Three-Dimensional Homogeneous Field Problems with Boundaries of Arbitrary Geometry," *International Journal of Infrared and Millimeter Waves*, Vol. 10, No. 8, August 1989, pp. 1007-1032.
- *K.J. Bunch and R.W. Grow*, "Backward-Wave Interaction Using Step Periodic Structures," *International Journal of Infrared and Millimeter Waves*, Vol. 9, No. 7, July 1988, pp. 609-629.
- *K.J. Bunch and R.W. Grow*, "The Surface-Matching Method for Solving Periodic and Helically-Periodic Slow Wave Structures for Traveling-Wave Simulation," *Proceedings of the SPIE*, vol. 1039, 1988, pp. 461-462.
- *K.J. Bunch and R.W. Grow*, "The Helically-Wrapped Circular Waveguide," *IEEE Transactions on Electron Devices (Vacuum Electron Devices)*, Vol. ED-34, No. 8, August 1987, pp. 1873-1884.
- *K.J. Bunch, R.W. Grow and J.M Baird*, "Backward Wave Interaction Using Step Periodic Structures," *Conference Digest, Twelfth International Conference on Infrared and Millimeter Waves*, Lake Buena Vista, Florida, December 14-18, 1987, pp. 99-100.

CONFERENCE PRESENTATIONS

- *B. Epstein, R.H. Olsson, K.J. Bunch*, "Arrays at Commercial Timescales: Addressing the Development and Upgrade Costs of Phased Arrays," IEEE Radar Conference (RADARCON), 23-27 March, Oklahoma City, OK, 2018.
- *R.H. Olsson, K.J. Bunch, C. Gordon, R. Bogoslovov, B. Epstein*, "Signal Processing at RF: An Overview," Government Microcircuit Applications & Critical Technology Conference (GOMAC), March 12-15, Miami, FL, 2018.
- *R.H. Olsson, K.J. Bunch, C. Gordon, N. Zhou*, "Creating a Universal Radio Frequency Front-End for Elemental Digital Beam Formed Phased Arrays," IEEE International Symposium on Phased Array Systems and Technology (PAST), 18-21 Oct., Waltham, MA, 2016.
- *R.H. Olsson, K.J. Bunch, C. Gordon*, "Reconfigurable Electronics for Adaptive RF Systems," IEEE Compound Semiconductor IC Symposium (CSIC), October 23-26, Austin, TX, 2016.
- *R.H. Olsson, K.J. Bunch, C. Gordon, N. Zhou*, "Creating a Universal Radio Frequency Front-End for Elemental Digital Beam Formed Phased Arrays," in IEEE International Symposium on Phased Array Systems & Technology, October 18-21, Waltham, MA, 2016.
- *R. Olsson, K.J. Bunch*, "Arrays at Commercial Timescales: An Overview of the DARPA ACT Program," Government Microcircuit Applications and Critical Technology Conference (GOMAC), March 14-17, 2016, Orlando, FL.
- *KJ Bunch*, "Countering Improvised Explosives Devices: An Foreign Policy Perspective," International Home-Made Explosives workshop, May 5-9, 2014, National Center for Explosives Training and Research, Huntsville, AL.
- *KJ Bunch*, "The Use of Homomorphic Encryption Methods Combined with Field Programmable Gate Array Hardware for Information Barrier Design," 54th annual Institute of Nuclear Materials Management meeting, July 14-18, 2013, Palm Desert, CA.
- *KJ Bunch*, "The Use of Homomorphic Encryption Methods to Support Nuclear Arms Verification," Poster Presentation, American Association for the Advancement of Science, August 1, 2013, Washington, DC.
- *KJ Bunch, LS Williams, AM Jones, P. Ramuhalli, J. Shergur*, "Electromagnetic Signatures as a Promising Tool to Verify Nuclear Weapons Storage and Dismantlement under an Arms Control Regime," 53th annual Institute of Nuclear Materials Management meetin, July 14-19, 2012, Orlando Florida.
- *M. Watkins, KJ Bunch, P. Ramuhalli, M. Jones*, "Guided Elastic Waves -The Potential for Containment and Surveillance Applications," International Workshop on Containment & Surveillance - Concepts for the 21st Century, Oak Ridge, TN, June 7-11, 2010.
- *Richard M. Ozanich Jr., Kathryn C. Antolick, Cynthia J. Bruckner-Lea, Kyle J. Bunch, Brian P. Dockendorff, Jay W. Grate, Michael A. Nash, Abby Tyler, Cynthia L. Warner, Marvin G. Warner*, "Bead-Based Assays for Biodetection: From Flow-Cytometry to Microfluidics," SPIE Defense and Security, April 13-17 2009, Orlando, FL.
- *K.J. Bunch, D.L. McMakin, D.M. Sheen*, "Wideband Fractal Antennas for Holographic Imaging and Rectenna Applications," SPIE Defense and Security, March 17-20 2008, Orlando, FL.
- *K.J. Bunch, A. Roesler, T. Friedman, C. Walker, B. Wroblewski, V.C. Hodges, T. Baginski*, "Investigation into Carbon-Trigger Vacuum Switches for High-Voltage, High-Current Switch Applications," International Vacuum Electronics Conference, April 25-27 2006, Monterey, CA.
- *A. Roesler, K.J. Bunch, G. Slama, D. Schofield, D. Abel, J. Bielawski, B. Stucke*, "Monolithic Micro-CDU (M2CDU)," Joint Munitions Program Fall TCG Symposium, Naval Postgraduate School, Oct 31-Nov. 6 2005, Monterey, CA.
- *A. Roesler, K.J. Bunch, E. Welle, S. Harris, C. Hazen*, "High Voltage Planar Switch," Joint Munitions Program Fall TCG Symposium, Naval Postgraduate School, Oct 31-Nov. 6 2005, Monterey, CA.
- *R.W. Grow, J.M. Baird, KJ Bunch, R.C. Freudenberger*, "Backward-Wave Oscillators for the Frequency Range from 300 GHz to 1 THz," International Vacuum Electronics Conference, May 2-4, 2000, Monterey, Ca.
- *M.F. Iskander, K.J. Bunch, M. White, C. Forrest, B. Bruce, and H. Kimrey*, "Simulation and Guidelines Towards the Routine Utilization of Microwave Processing in Multimode Cavities," 30th Annual Meeting of the International Microwave Power Institute, July 9-12, 1995,

Denver, Co.

- *J.D. Newman, L. Walsh, R. Evans, O.M Andrade, M.F. Iskander, H. Kimrey, K.J. Bunch,* "Experimental Validation of Numerical Simulations of the Microwave Sintering Process," 95th Annual Meeting of the American Ceramics Society, April 18-22, 1993, Cincinnati, Ohio.
- *K.J. Bunch and R.W. Grow,* "The Cylindrical Waveguide with Sinusoidally Perturbed Walls for High-Power Gyrotron Applications," Conference Digest, The Fifteenth International Conference on Infrared and Millimeter Waves, Orlando, Florida, December 10-14, 1990, pp. 313-314.
- *K.J. Bunch and R.W. Grow,* "Electric-Field Distribution of the Palladium Crystal Lattice," First Annual Conference on Cold Fusion, March 1990.
- *K.J. Bunch and R.W. Grow,* "The Surface-Matching Method for Solving Periodic and Helicallly-Periodic Slow Wave Structures for Traveling-Wave Simulation," Conference Digest, Thirteenth International Conference on Infrared and Millimeter Waves, Honolulu, Hawaii, December 4-8, 1988, pp. 461-462.
- *K.J. Bunch, R.W. Grow and J.M Baird,* "Backward Wave Interaction Using Step Periodic Structures," Conference Digest, Twelfth International Conference on Infrared and Millimeter Waves, Lake Buena Vista, Florida, December 14-18, 1987, pp. 99-100.
- *K.J. Bunch and R.W. Grow,* "Numerical Aspects to Solving EM Field Problems in Millimeter-Wave Devices Using Boundary Residual Methods," Conference Digest, The Fourteenth International Conference on Infrared and Millimeter Waves, Wurzburg, Germany, October 2-6, 1989, pp. 168-169.

INVITED ADDRESSES

- *KJ Bunch,* "Changing the World through Science and Technology: Engineering Diplomacy as an Alternative Career," invited address to the George Mason University, Fairfax, VA, April 22, 2013.
- *KJ Bunch,* "Changing the World through Science and Technology: Engineering Diplomacy as an Alternative Career," invited address to the Department of Engineering Science & Mechanics, Pennsylvania State University, University Park, PA, January 23, 2013.
- *KJ Bunch,* "Terahertz Sources using Hybrid Electron/Solid State Technology," invited address to Palo Alto Research Center, Palo Alto, CA, January 16, 2012.
- *K.J. Bunch,* "Overview of Electromagnetic Applications and Research: DC to MM Waves," invited address to the University of Utah, Department of ECE, April 23, 2009.
- *K.J. Bunch,* "Terahertz Sources based on Microfabricated Vacuum Electron Devices and their Applications," Invited address to Pacific Northwest National Laboratories, Richland, WA, June 15, 2006.
- *KJ. Bunch,* "Development of a Microfabricated, Tunable Millimeter Wave Source," invited address to the Albuquerque IEEE Joint Chapter, Albuquerque, NM, March 22, 2006.
- *K.J. Bunch,* "Development of a Microfabricated, Tunable Millimeter Wave Source," invited address to the Lawrence Livermore National Laboratory, Livermore, CA, Nov. 4, 2005.
- *K.J. Bunch,* "The Simplification of Boolean Functions," invited address to the department of Electrical and Computer Engineering Technology, Purdue University, May 21, 2004.
- *K.J. Bunch,* "Digital Reconfigurable Motor for High Efficiency Applications," invited address to the department of Systems Engineering, University of Arkansas at Little Rock, May 10, 2004.
- *K.J. Bunch,* "A Digital Reconfigurable Motor for High Efficiency Applications," invited address to the department of Electrical Engineering, Cal Poly State University, April 2, 2004.
- *K.J. Bunch,* "Electromagnetic Considerations in the Design and Operation of Analog and Digital Circuits," invited address to the department of Electrical Engineering, University of North Florida, March 24, 2004
- *K.J. Bunch,* "Electromagnetic Considerations in the Design and Operation of Analog and Digital Circuits," invited address to the department of Electrical Engineering and Computer Engineering, Virginia Military Institute, March 3, 2004.
- *K.J. Bunch,* "The Convergence of Analog and Digital in High Speed Systems," invited

address to the department of Electrical Engineering, Western Kentucky University, Nov. 19, 2003.

- *K.J. Bunch*, "A Novel Digital Electric Motor for use in Electrical Vehicles," invited address to the Symposium of the Department of General Electrotechnics, Spale, Poland, June 11-13, 2001.
- *K.J. Bunch*, "Creating Content for the World Wide Web: An Overview for Scientists and Engineers," invited address to the Symposium of the Department of General Electrotechnics, Zakosciele, Poland, June 8, 1998.
- *K.J. Bunch*, "The American University System," invited address to the Polish Society of Theoretical and Applied Electronics, Technical University of Lodz, Poland, May 5, 1994.
- *K.J. Bunch*, "Time Management and Goal Setting for Polish Academia," invited address to the Symposium of the Department of General Electrotechnics and Instrument Transformers, Zakosciele, Poland, June 15, 1994.
- *K.J. Bunch*, "The American University System," invited address to the University of Mining and Metallurgy, Cracow, Poland, July 19, 1994.
- *K.J. Bunch*, "The American University System," invited address to the University of Novgorod, Novgorod, Russia, July 6, 1994.
- *K.J. Bunch*, "The American University System," invited address to the University of St. Petersburg, St. Petersburg, Russia, July 8, 1994.
- *K.J. Bunch*, "EM and Device Research at the University of Utah," University of Hawaii at Manoa Department of Electrical Engineering, Feb. 12, 1992.
- *K.J. Bunch*, "The Boundary Residual Method for Electromagnetics," University of Colorado at Denver Department of Electrical Engineering, May 10, 1992.

REPORTS/WHITE PAPERS/PROPOSALS

- *JE Baciak, JM Benz, KJ Bunch, BA Greenfield, AJ Kurzrok, DE Meier, C Toomey, LS Williams, ET Wyse, HA Mahy*, "Diplomacy & Global Nuclear Security: Understanding Laws, Treaties, and Agreements," Course developed for the National Defense University (NDU), Pacific Northwest National Laboratory, Report PNNL- 21351, June 2012.
- *AT Evans, KJ Bunch, JF Kelley, JE Jaffe, DJ Puzycki*, "EMI Electromagnetic Interference Forecast," Pacific Northwest National Laboratory, Report PNNL- SA-85470, February, 2012.
- *AT Evans, KJ Bunch, JF Kelly, JE Jaffe, DJ Puzycki*, "EMI Electromagnetic Forecast," Pacific Northwest National Laboratory, December 2011.
- *J. Brown, KJ Bunch, et al*, "Power Network—Failure Scenarios and Mitigation Strategies: Technical Research Investigation," Pacific Northwest National Laboratory, Sept 12, 2011.
- *KJ Bunch*, "Engineered Diffuser—Progress and Recommendations for Path Forward," Pacific Northwest National Laboratory, June 17, 2011.
- *KJ Bunch*, "Shielding against a High-Altitude Nuclear-Induced Electromagnetic Pulse-- Simulations on a Sample Structure," Pacific Northwest National Laboratory, Report PNNL- 19188, Feb. 2010.
- *KJ Bunch, ME Jones*, "Detection of Objects in Littoral Environments," Pacific Northwest National Laboratory, Report PNNL-19511, May 2010.
- *J. Brown, KJ Bunch, D. Puzycki, C. Eyre, R. Slaugh, B. Johnson*, "Power Networks— Mapping & Evaluation Strategies: Technical Research Investigation," July, 2010.
- *J. Brown, KJ Bunch, D. Puzycki, C. Eyre, R. Slaugh, B. Johnson*, "Power-Line, Protection Technologies: Technical Research Investigation," May 2010.
- *KJ Bunch*, "Penetration of an Applied Electromagnetic Pulse into a Metallic Enclosure," Report PNNL-19087, Dec. 2009.
- *RM Pratt, KJ Bunch, DJ Puzycki, RW Slaugh, MS Good, DL McMakin*, "Cell Phone Detection Techniques," Pacific Northwest National Laboratory, Report PNNL-17734, October, 2007.
- *K.J. Bunch*, "Investigation into carbon-trigger vacuum switches for high-voltage, high-current switch applications," Sandia National Laboratories report 2005-6738 A, June 8, 2005.
- *K.J. Bunch*, "The Helically-Wrapped Circular Waveguide," AFTER-22, November 14, 1986.
- *K.J. Bunch and R.W. Grow*, "Theoretical and Numerical Foundations of a Boundary-Residual Method for Solving Three-Dimensional Boundary-Value Problems in

Electromagnetics," Technical Report MDPEL-5, February 19, 1990.

- *E. Posey, B. Gottling, T. Simmonds, R. Clausing, L. Hawkins, K.J. Bunch*, "Analysis, Design and Testing of a Dual Channel Compact Manifold," 1st Interim Report, Oct. 29, 1992.
- *R. Evans, T. Ngo, D. Newman, T. Tholen, L. Walsh, S. Bringham, Z. Huang, H. Kimrey, K.J. Bunch, M. F. Iskander*, "Microwave Heating and Processing of Ceramic Materials, Final Report, June 10, 1993.
- *Z. Bullock, S. Dillon, G. Garcia, A. T. Rojas, K. Yates, S. Bringham, M. White, K.J. Bunch, M. F. Iskander*, "Microwave Heating and Processing of Ceramic Materials, 1st Interim Report, Sept. 7, 1995
- *M. Aghdasi, R. Hanson, N. Mueller, R. Stout, K.J. Bunch, M. Iskander*, "Design of a 15 MHZ Low-Pass Bandwidth Detection Circuit for Pulsed Network Analysis, 2nd Interim Report, Feb. 8, 1995.
- *KJ Bunch, J. Griffin, B. Braatz*, "Microwave-Enhanced Fuel Combustion Study," Submitted to the FY2012 Energy and Environment Directorate LDRD, \$275K.
- *KJ Bunch*, "Exploitation of Different Electric Motor Technologies Combined and Optimized for Efficiency and Performance," Submitted to the FY2012 Energy and Environment Directorate LDRD, \$275K.
- *KJ Bunch, D. Matson, A. Evans*, "Photocell Efficiency Improvements using Manufacturable Biomimetic Structures," Submitted to the FY2012 Energy and Environment Directorate LDRD, \$275K.
- *KJ Bunch, D. Matson, A. Evans, A. Lakhtakia*, "Photocell Efficiency Improvements using Manufacturable Biomimetic Structures," Submitted to the FY2012 Labwide LDRD call, \$750K.
- *KJ Bunch, J. Northrup, A. Lakhtakia, A. Evans, R. Erikson*, , "Photocell Efficiency Improvements using Manufacturable Biomimetic Structures,"submitted the FY2011 US DOE call DE-FOA-0000387 "Transformational PV Science and Technology: Next Generation Photovoltaics II," May 2011, \$1.5M.
- *KJ Bunch, P. Ramuhalli, R. Meyer, M. Good*, "Guided Stress Wave Tool for Design Information Verification," submitted to the FY2012 NA241, "Next Generation Safeguards Initiative – Safeguards Technology Development Subprogram," \$1.2M.
- *KJ Bunch, P. Ramuhalli, R. Meyer*, "Investigation into Guided Ultrasonic Waves for Structural and Material Investigation," submitted to FY2012 National Security Directorate LDRD, \$275K.
- *KJ Bunch, P. Ramuhalli, A. Evans*, "Investigation into Carbon Nanotube and other Nanostructural Carbon Material for RF tagging and Power Scavenging Applications," submitted to FY2012 NSD LDRD, \$250K.
- *KJ Bunch*, "The Development of Biometric Driving Signatures Based on Micro and Macro Driving Behavior," concept paper submitted to the Intelligence Advanced Research Project Agency (IARPA), March 2011.
- *KJ Bunch*, "Survey and Development of Novel Biometric Signatures for Counterintelligence Applications," submitted to the FY2011 NCIX CI Integration Initiative (CI3) call, Nov. 2010, \$500K.
- *R. Meyer, KJ Bunch, P. Ramuhalli*, NNSA Science and Security Consortium, submitted with the University of Missouri as lead institution, Nov. 2010, \$1.1M.
- *A. Lakhtakia, KJ Bunch*, et al, "Center for Harnessing Light," submitted as a partner under Pennsylvania State University as lead to the National Science Foundation, May 2011.
- *R. Meyer, KJ Bunch, D. Stephens*, "Development of a scalable neutron sensitive diamond detector via integration of small modular single crystal diamond chips," submitted to the labwide LDRD, June, 2010.
- *KJ Bunch, M. Watkins*, "The Development of Biometric Driving Signatures Based on Micro and Macro Driving Behavior," submitted to the signature science initiative, April, 2010.
- *KJ Bunch*, "Development of Sculpted Film Surfaces for Metamaterial Applications," user proposal submitted to the Molecular Foundry at Lawrence Berkeley Lab, June 2010.
- *KJ Bunch*, "Investigation into Sculpted Film Metamaterials for Designed Electromagnetic Behavior," user proposal submitted to the Environmental and Molecular Sciences Laboratory at Pacific Northwest National Laboratory, July 2010.

- *KJ Bunch, M. Jones, P. Ramuhalli, K. Denslow*, "Exploration of Guided Elastic Waves for Containment, Surveillance, and Nuclear Arms Control Applications," submitted to the NSD 2010 LDRD process.
- *M. Jones, G. Sandness, KJ Bunch*, "Development and Integration of Electromagnetic Signature for Composite Method to Detect Nuclear Threats," submitted to the signature science initiative, 2010.
- *KJ Bunch, M. Good*, "Next Generation Electromagnetic Signal Analysis for Nuclear Arms Non-Proliferation Verification," NA22 submission, Jan. 2010.
- *KJ Bunch, M. Watkins, P. Ramuhalli, S. Cumblidge, J. Rose*, " Guided Stress Wave Tool for Design Information Verification (DIV)," NA 24 Global Safeguards submission, Feb. 2010.
- *KJ Bunch*, "Development of a Ballistic Electron Microfabricated Cathode" Funded. Submitted to FY08 Laboratory Directed Research and Development.
- *KJ Bunch*, "Carbon Nanotube Terahertz Passive Tag," submitted to FY08 Laboratory Directed Research and Development (LDRD).
- *KJ Bunch*, "Fabrication of a Carbon Nanotube Thermionic Cathode," funded as user facility proposal, at the Environmental and Molecular Sciences Laboratory, PNNL. Also funded as user facility proposal, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory.
- *D. McMakin, KJ Bunch*, "Ground penetrating radar holographic imaging system for underground IED detection," submitted to ONR Counter IED Basic Research.
- *KJ Bunch*, "Underground IED Destruction using low frequency magnetics," submitted to the Joint IED Defeat Organization.
- *KJ Bunch*, "Low cost underwater intrusion detection system using low frequency electromagnetics," Submitted to ONR "Low cost swimmer detection."
- *D. Puzycki, KJ Bunch, R. Slauch*, "Electronic Emulation System," funded, submitted to NA42, Render Safe R&D Program.
- *KJ Bunch*, "Underground IED detection and destruction using low frequency magnetic arrays," submitted to ONR Counter IED Basic Research.
- *KJ Bunch*, "Underwater Chaotic Communication System," submitted jointly with Los Alamos to FY08 DOE Advanced Technologies Program as well as FY 2008 LDRD.
- *D. McMakin, D. Sheen, KJ Bunch*, "Circular or Full Polarimetric Holographic Radar Imaging for Tunnel and IED Detection," funded LDRD.
- *J.W. Wiskin, D.T. Borup, K.J. Bunch*, "Origin and Analysis of Signals in Bioengineering," March 1999, submitted to the Whitaker Foundation.
- *K.J. Bunch, S.A. Johnson, R. Johnson, and D. Borup*, "The Use of Ground-Penetrating Radar Imaging for Monitoring and Characterizing Waste Sites," December 1994, submitted to the DOE solicitation # DE-RO21-94MC31305.
- *K.J. Bunch*, "Development of an Object-Oriented Scientific Programming Environment," June 1992, submitted under NSF SBIR 92-30.
- *K.J. Bunch*, "Investigation and Design of a Near Neighbor Mesh Architecture for General Purpose Computing," January 1992, submitted under SBIR DARPA 92-068.
- *K.J. Bunch*, "Superconductor Traveling Wave Device Investigation for Phased Array Antenna Applications," January 1992, submitted under SBIR AF 92-041.
- *K.J. Bunch*, "Investigation into Traveling Waves within High Temperature Superconductors," January 1992, submitted under SBIR AF 92-131.
- *R.W. Grow and K.J. Bunch*, "Investigation into Traveling-Wave Behavior Within High-Tc Superconducting Ceramics for High-Frequency Device Development," submitted to the Air Force Office of Scientific Research (AFOSR).
- *R.W. Grow, J.M. Baird, K.J. Bunch*, "An Auto-Resonant Accelerated (ARA) Beam-Drive, Tunable FEL Source in the 100GHz- 1THz Range," submitted to the Air Force Office of Scientific Research.
- *R.W. Grow, K.J. Bunch, L.P. Sadwick*, "Investigation Into Quasi-One- and Two-Dimensional Quantum Traveling-Wave Devices, February 1992, submitted to NSF.
- *R.W. Grow, K.J. Bunch, W.N. Cain*, "Development of a Ballistic-Electron Solid-State Cathode and Compact Wideband RF Power Amplifier," February 1991, submitted to DARPA Vacuum Electronics Initiative Broad Agency Announcement BAA #91-01.

- *R.W. Grow, K.J. Bunch*, Development of a Ballistic-Electron Solid-State Cathode and Compact Wide-Band RF Power Amplifier," April 1991, submitted to the Tri-Service Vacuum Electronics Research Program.
- *K.J. Bunch*, "Development of a Ballistic Electron Solid State Cathode," October 1990, Faculty Grant Proposal.
- *K.J. Bunch, W.N. Cain, R.W. Grow and J.M. Baird*, "Tunable Gyrotron Backward Wave Oscillator," 1988.

PATENTS

- *K.J. Bunch, D.L McMakin*, "Holographic Imaging Based on Time-Domain Data of Natural-Fiber-Containing Materials," US Patent No. 8,258,995, September 4, 2012.
- *K.J. Bunch, B. Tucker, R. Severtsen, T. Hall, D. McMakin, R. Harris, W. Lechelt, J. Griffin*, "Holographic Imaging of Natural-Fiber-Containing Materials," US Patent No. 7,855,673 December 21, 2010.
- *AW Roesler, JM Schare, KJ Bunch*, "Microfabricated Triggered Vacuum Switch," US Patent No. 7,714,240, May 11, 2010.
- *J. Bailey and KJ Bunch*, "Electronically Controlled Electric Motor," US Patent No. 7,564,208, July 21, 2009.
- *J. Bailey and KJ Bunch*, "Electronically Controlled Electric Motor," US Patent No. 7,248,006, July 24, 2007.
- *J. Benowitz and KJ Bunch*, "Technology enhanced communication authorization system," US Patent Application No. 10/465,245, June 19, 2003.
- *J. Benowitz and K.J. Bunch*, "Using a Networked Verification System to Verify the Existence and Accuracy of Data," 2002.
- *K.J. Bunch, W.N. Cain and R.W. Grow*, "A Solid State Ballistic Electron Cathode," US Patent No. 5,359,257, October 25, 1994.

PATENT DISCLOSURES

- *KJ Bunch, M. Dixit, R. Meyer*, "Avalanche-Breakdown Effect in Diamond Material for Voltage Clamping and Radiation Detection," August 2010.
- *M. Watkins and K.J. Bunch*, "Method and means to determine moisture content of wood products during processing," June 2007.
- *K.J. Bunch, T. Hall, R. Harris, D. McMakin, R. Severtsen, B. Tucker*, "Moisture measurement using microwave holographic imaging methods," September 2007.
- *K.J. Bunch, R. Pratt, D. Puzycki, R. Slauch*, "Cell phone detection method," September 2007.
- *K.J. Bunch*, "Carbon nanotube terahertz tag," November 2007.
- *K.J. Bunch, D. McMakin, D. Sheen*, "Fractal antennas for harmonic radar," February 2008.
- *KJ Bunch and A. Roesler*, "A Thermionic Carbon Nanotube Emitter, Feb. 2005.
- *KJ Bunch*, "A Method to Detect Missile Ground Penetration," Mar. 2005.
- *KJ Bunch, A. Roesler*, "A Vacuum Switch Using and Electronic Breakdown Process," Jan. 2005.
- *K.J. Bunch, W.N. Cain, R.W. Grow, and J.M Baird*, "Gyrotron Backward Wave Oscillator," 1988.
- *K.J. Bunch and W.N. Cain*, "Television Lock-Out Scheme," 1990.
- *K.J. Bunch and W.N. Cain*, "Telephone Lock-Out Scheme," 1990.

FUNDED PROPOSALS

- *K.J. Bunch*, "Sculpted Films," classified, \$500K, 2009-2010.
- *K.J. Bunch, PI, A.M. Jones, PI*, "Low Frequency Electromagnetic Interrogation Techniques for Container Content Signature Detection," Funded. FY 2010 Laboratory Directed Research and Development, PNNL, \$350K.
- *K.J. Bunch, PM, PI*, "Development of a Ballistic Electron Microfabricated Cathode" Funded. Submitted to FY08 Laboratory Directed Research and Development, PNNL, \$240k.
- *K.J. Bunch, PM, PI*, "Fabrication of a Carbon Nanotube Thermionic Cathode," funded as user facility proposal, at the Environmental and Molecular Sciences Laboratory (EMSL), Pacific Northwest National Laboratory.

- *K.J. Bunch*, "Fabrication of a Carbon Nanotube Thermionic Cathode," funded as user facility proposal, Center for Nanophase Materials Sciences (CNMS), Oak Ridge National Laboratory.
- *D. Puzycki, PM, K.J. Bunch, PI*, "Electronic Emulation System," NA42, Render Safe R&D Program, \$150K.
- *M. Jones, PM, KJ Bunch, PI*, NW Maritime Information & Littoral Operations, \$100K.
- *K.J. Bunch (PI), A. Roesler*, "Microfabricated High Voltage Vacuum Switch," \$750K.
- *K.J. Bunch*, Principal Investigator, "A novel high-efficiency 'digital' electric motor for electric vehicles and industry," NIST ATP award 70NANB1H3018, M. Didier, J. Bailey, XiDEM Corporation, 13526 S. 110 W. Draper, UT, October 1, 2001, \$2M.
- *R.W. Grow*, Principal Investigator, "Backward-Wave Oscillator for the Frequency Range from 300 GHz to 1 THz," Army Research Laboratory, Contract # DAAL01-95-K-3541, 1997.

SERVICE/RECOGNITION

- Current Chair, past Committee Member, Institute of Electrical and Electronic Engineers (IEEE) Government Fellows Committee
- Member, IEEE ad-hoc Committee on Artificial Intelligence (AI) Policy
- Meritorious Honor award, U.S. Department of State, for "Sustained superior Performance from April 2013 to April 2014 in executing the U.S. National Strategy to counter the global threat of improvised explosives devices"
- Joint Program Office for Countering Improvised Explosives Devices (JPO-CIED) Implementation Committee, November 2013-Jan 2015.
- Science and Technology Committee for Countering Explosives Devices (Subcommittee of National Science and Technology Council/Council on Homeland and National Security), April 2014-Jan 2015.
- NSF Proposal Review Panelist, Electrical, Communications and Cyber Systems (ECCS), areas of electromagnetic and photonic devices, January 23-24, 2014.
- Instructor, Center for Strategic and International Studies, Progress on Nuclear Issues (PONI), hands-on training exercises, Voltenpest HAMMER Training and Education Center, Richland, WA, April 19, 2012.
- Corresponding Member, IEEE-USA Energy Policy Committee, 2011-2012.
- Publications Chair for the IEEE 2008 international Nanotechnology Conference, August 18-21, 2008, Arlington, TX.
- Publications Chair for the IEEE 2008 international Nanotechnology Conference, August 18-21, 2008, Arlington, TX.
- Utah Section Chair, Institute of Electrical and Electronics Engineers (IEEE), May 1996-May 1997
- Recognition as Publications Chair, 2008 IEEE Nanotechnology Conference
- Recognition, IEEE Power Engineering Society, 2008 PE Exam Review Class
- Outstanding Performance in Support of Intelligence Missions, July, 2008, Pacific Northwest National Laboratory
- Exceptional Contribution, Strategic Plan and Organizational Development, 2007, Applied Physics, Pacific Northwest National Laboratory
- Outstanding Contribution, Advanced Technology Program and Digital Electric Motor development, XiDEM Corporation, Dec. 2001
- Senior Member, Institute of Electrical and Electronics Engineers (IEEE), March 1998-present
- Member, Institute of Electrical and Electronics Engineers (IEEE), May 1985-present
- Finalist, OpenStage Playwriting Competition, 1986.
- Finalist, Marvin Taylor Playwriting award, 1988
- Colorado Engineer writing award, 1982
- American Chemical Society award, Colorado Chapter, 1977