ALAN M. BARKER

OBJECTIVE

- Research and develop advanced measurement and control systems, including the simulation, modeling, data collection, testing, and deployment of complex electronic and embedded systems.

EDUCATION

- **M.S.,** Purdue University, **Electrical and Computer Engineering** May 2008
  Communications, Networking, Signal & Image Processing.
  Thesis: "A Distributed Road Condition Monitoring System for Vehicle Infrastructure Integration"
- **B.S.,** Tennessee Technological University, **Electrical Engineering** May 2006
  Telecommunications, Mathematics Minor, In Cursu Honorum.
  Top EE Graduate. One of five finalists for Derryberry Award, the university's most prestigious student award.

AWARDS

- Part of team ORNL Significant Event Award (SEA) for First plasma on Proto-MPEX 2014
- Recipient of **Eaton Award** in Design Excellence, which recognizes outstanding work in the field of design by recent Purdue ECE alumni – one selected from pool of about 1,600 alumni who have graduated within the past 5 years 2013
- Part of team ORNL Significant Event Award (SEA) for ITER ICH Resonant Ring 2013
- Part of team ORNL Significant Event Award (SEA) for RFID Accountability System 2010
- Part of team Exceptional Effort Award from ORNL MSSE Division for outstanding progress achievement on Common Radar Environment Simulator 2009

COMPUTER SKILLS & TRAINING

- MATLAB: time and frequency domain signal analysis, Simulink, C-code generation, VHDL generation for FPGA, graphical user interface development
- LabVIEW: LabVIEW and SignalExpress software, data collection from National Instruments USB data acquisition boards, OPC Server, Datalogging and Supervisory Control (DSC) Module, PLC integration, Serial and Ethernet communication, Vehicle CAN, SAE J1939, CompactRIO and PXIe platforms, FPGA and FlexRIO, GPS receiver, vehicle odometer; motion control of optics actuator
- Allen Bradley SLC 500 PLC and RSLogix 500 software, ControlLogix PLC and RSLogix 5000 software
- Windows-oriented: Zebra/WhereNet RFID technology, scripts, Symantec Ghost backup software, DOD Gold Disk security hardening tool, Group Policy, Microsoft Office, Google Earth/Maps, Visual C++/C#/Basic, SQL Server
- Unix/Linux-oriented: Python, Version Control (Mercurial, SVN), Latex
- Vehicle databus: CAN, PEAK CAN USB, SAE J1939
- Six day "ORNL Management Boot Camp" – 2014
- One day "ORNL Project Management Fundamentals" - 2014
- One week "CODAC Core System Workshop" at US-DA for ITER - 2014
- One day "Build Your Own Embedded System" Workshop by National Instruments - 2014
- One day "Automotive Network Seminar and Training" by Intrepid Control Systems - 2014
- One day "Project Teams" course by New Horizons - 2014
- One day "Project Management Fundamentals" course by New Horizons –2014
- Three day "LabVIEW Core III" class by National Instruments – 2014
- Four day "High-Throughput LabVIEW FPGA and FlexRIO" class by National Instruments – 2012
- 6 week "Designing with FPGAs" non-credit course – 2010

- Three day "Real-Time Workshop Embedded Coder for Production Code Generation" class by Mathworks – 2009
- Five day "Professional C++" class by Object Discovery Corporation – 2009
- Two day "IBM Cell BE" Class – 2008

AFFILIATIONS & SPECIAL QUALIFICATIONS

- Active DOE Q Clearance
- Certified LabVIEW Associate Developer (CLAD)
- Member, IEEE and Intelligent Transportation Systems Committee
- Member, Intelligent Transportation Systems-TN
- Electrical Safety Training
    - ORNL Qualified Electrical Worker 3 (<600 V) + RF, DC, Battery, Capacitor, Inductor, CPR/AED, Lockout/Tagout, High Voltage Safety Awareness, NFPA 70E
- Member, Knoxville/Oak Ridge LabVIEW Users Group
- Tennessee Engineer Intern Examination

WORK EXPERIENCE

- Oak Ridge National Laboratory (ORNL), Oak Ridge, TN 2008-present
  R&D Staff, Electronics and Embedded Systems Group 2013-present
  Electrical and Electronics Systems Research Division.
    - *Proto Materials Plasma Exposure eXperiment (MPEX) Fusion Energy LDRD*
      System and software developer and designer. Allen Bradley Controllogix and FlexIO PLC and LabVIEW human machine interface.
    - *Directorate server manager*
      Manage about 7 machines providing about 75 TB of secure, robust data storage and other R&D project computing resources such as license managing, software repositories, etc. to over 700 staff

  R&D Associate, Electronics and Embedded Systems Group, 2010-2013
  Electrical and Electronics Systems Research Division.
    - *Electron Cyclotron Heating (ECH) ORNL ITER Fusion Energy Test Stand*
      System design engineer, software lead for a monitoring and control application to operate a 1 MW, 130 GHz gyrotron using LabVIEW and Allen Bradley Programmable Logic Controllers (PLCs). Additional data acquisition and slow control support for thermal cycling test stand, Japan Atomic Energy Agency test stand, microwave switch cycling test stand, and vacuum pump down test stands.
    - *Safeguarding Truck-Shipped Wholesale and Retail Fuels for USDOT Federal Highway Administration (FHWA)*
      Participate in Phase II Evidential Reasoning System architecture and software design and development for on-board and back office systems
    - *Wireless Roadside Inspection (WRI) Project for USDOT Federal Motor Carrier Safety Administration (FMCSA)*
      Participate in Phase III committees to develop specifications for WRI, with a focus on System Architecture and ConOps.
    - *Spallation Neutron Source (SNS) Data Acquisition and Control Support*
      Primarily LabVIEW software support for Liquid Reflectometry instrument upgrade project. Added additional functionality to a temperature controller application, and added potentiostat (an electrochemistry device) and Langmuir Trough (used to compress monolayers on a liquid subphase) sample environment device applications.
    - *Energy Awareness and Resiliency Standardized Services (EARSS) Automation*

Use Python software to automate Geographic Information System (GIS) analysis of how natural disasters impact the electric grid in real-time.

- *Medium Truck Duty Cycle (MTDC) Project for the Dept. of Energy*
  Maintain vehicular data collection system for several vehicles in the East TN area. Develop MATLAB "quick look" data analysis tool.
- *Radio Frequency Identification (RFID) Accountability System (RAS) for the Federal Bureau of Investigation (FBI)*
  Developed pilot RFID system. Software development and system integration for all aspects of the system, in particular the cart station and handheld to PC synchronization.
- *AmBe Neutron Source Experiment for NASA*
  Set up LabVIEW-based data collection system for voltage measurements taken before and after series of neutron exposures for printed circuit board experiments.
  As software lead, wrote MATLAB software to visualize and verify collected data and analyze and plot results.
- *Smaller efforts*
  - Provide data acquisition and control software and design support to other fusion test stands at ORNL such as Materials Plasma Exposure eXperiment (MPEX) and ITER Ion Cyclotron Heating

R&D Assistant, Real Time Systems Group, Measurement Science and Systems Engineering Division. 2008-2010

- *Radio Frequency Identification (RFID) Accountability System (RAS) for the National Geospatial-Intelligence Agency (NGA)*
  As testing lead, prepared and implemented system test plan for large-scale RFID system. Developed software for handheld PC's and mobile workstations. Created scripts and procedures for background processes and data and system backups. Hardened Windows machines to pass security acceptance. Participated in procurement of hardware and software.
- *Common Radar Environment Simulator for Army's Project Manager (PM) Radars*
  Unit and system level testing, documentation, and code development in Simulink for radar environment simulation to run on x86, DSP, and FPGA targets. Developed auto-updating source code documentation scripts using Simulink Report Generator.
- *Irradiation Experiment at High Flux Isotope Reactor (HFIR) for NASA*
  Set up LabVIEW-based data collection system for voltage measurements taken before and after series of irradiations for printed circuit board experiments.
  As software lead, wrote MATLAB software to visualize and verify collected data and analyze and plot results. Prepared final report summarizing test results.
- *Smaller efforts*
  - Report on use of Experimental Physics Instrumentation and Control System (EPICS) for interfacing with electrical power meters for National Institute of Standards and Technology (NIST)
  - Review Use Cases, Concept of Operations (CONOPS) and other design documentation for the Range Radar Replacement Program (RRRP)
  - Design and implement test cases and techniques for WiMAX hardware for Motorola
  - Create elevation profiles for combat Theater Positioning System test site

- Dept. of Electrical/Civil Engineering, Purdue University, West Lafayette, IN. 2006-2008
  Intelligent Transportation Systems Graduate Research Assistant.
  Implemented algorithms using the Mathworks MATLAB environment for properly aligning sensor data and averaging them using cross-correlation techniques. Built LabVIEW data collection system for sensor-equipped vehicles. Developed scripts to display information in Google Earth.
- Oak Ridge National Laboratory (ORNL), Oak Ridge, TN. Summer 2006

Spallation Neutron Source (SNS) Accelerator Physics Division Intern.
Designed and tested Laser Drift Feedback Control for SNS using LabVIEW programming environment.

- Tennessee Technological University (TTU) scholarship. 2002-2006
  Undergraduate Research. Created tutorial for MATLAB and Kinema software for non-thermal plasma discharge research. 2006

PUBLICATIONS

- S. J. Fernandez, O. A. Omitaomu, S. Chinthavali, D. B. Koch, **A. M. Barker**, "Common Operational Picture", Sponsor report (2014)
- O. Franzese, G. J. Capps, A. Siekmann, M. B. Lascurain, **A. M. Barker**, B. Lantz, D. Carroll, J. Lobato, D. West, "Functional Specifications to Support the Wireless Roadside Inspection Field Operational Test", Sponsor report. (2013)
- G. J. Capps, O. Franzese, A. Siekmann, M. B. Lascurain, **A. M. Barker**, S. A. Moore, "Phase III Wireless Roadside Inspection Field Operational Test (WRI FOT): Year One Draft Interim Report", Sponsor report. (2013)
- **A. M. Barker**, E. B. Freer, O. A. Omitaomu, S. J. Fernandez, S. Chinthavali, J. B. Kodysh, "Automating Natural Disaster Impact Analysis: An Open Resource to Visually Estimate a Hurricane's Impact on the Electric Grid", *IEEE SoutheastCon 2013*, Jacksonville, FL (2013).
- M.B. Lascurain, O. Franzese, G.J. Capps, A. Siekmann, N. Thomas, T.J. LaClair, **A. M. Barker**, H.E. Knee, "Medium Truck Duty Cycle Data from Real-World Driving Environments: Final Report", DOE Vehicle Systems Program Project Report (2012).
- T.S. Bigelow, D.A. Rasmussen, G.R. Hanson, B. Peters, R. Sanabria, C.R. Schaich, T.L. White, K.L. McElhaney, R. Moon, S.L. Gray, I.L. Griffin, W.J. Wolfram, **A.M. Barker**, S.Killough, C.A. Ausmus, J.A. White, F. Gandini, K. Takahashi, K. Sakamoto, B. Olstadt, J. Doane, R. Callis, C. Moeller, M. Shapiro, R. Temkin, "Testing of Transmission Line Components for the ITER ECH System", Poster, *Technology of Fusion Energy*, Nashville, TN, (2012).
- **A. M. Barker**, S. M. Killough, T. S. Bigelow, J. A. White, J. K. Munro Jr., "A Case Study of Modern PLC and LabVIEW Controls: Power Supply Controls for the ORNL ITER ECH Test Stand," *Future of Instrumentation International Workshop*, Oak Ridge National Laboratory, Oak Ridge, TN, (2011).
- **A. M. Barker**, G. R. Hanson, A. K. Sexton, J. P. Jones Jr., E. B. Freer, A. L. Sjoreen, "An Active RFID Accountability System (RAS) for Constrained Wireless Environments," *Future of Instrumentation International Workshop*, Oak Ridge National Laboratory, Oak Ridge, TN, (2011).
- T.S. Bigelow, **A.M. Barker**, J.B. Caughman, G.R. Hanson, S.M. Killough, D.A. Rasmussen, C.R. Scaich, J.A. White, C.A. Ausmus, P.V. Pesavento, M.P. Simpson, "ITER ECH Transmission System Test Stand and Prototype Component Development", Poster, *International Conference on Plasma Science*, Chicago, IL, (2011).
- T.S. Bigelow, J.B. Caughman, **A.M. Barker**, G.R. Hanson, S.P. Killough, C.R. Schaich, P.M. Pesavento, D.A. Rasmussen, J.A. White, "Testing of gyrotrons and waveguide components for MAST and ITER," Poster, *Radio Frequency Power in Plasmas*, Newport, RI, (2011).
- M. Ndoye, **A. M. Barker**, J. V. Krogmeier, D. M. Bullock, "A Recursive Multi-Scale Correlation-Averaging Algorithm for an Automated Distributed Road Condition Monitoring System," *IEEE Transactions on Intelligent Transportation Systems* (2011).
- B. Vacaliuc, **A. M. Barker**, B. Chaffins, J. Munro, D. Strenski, "A Tool for Design Space Exploration Using Multi-Core, FPGA and GPU in Programmable Automation Controllers," *Future of Instrumentation International Workshop*, Oak Ridge National Laboratory, Oak Ridge, TN, (2010).
- M. Ndoye, **A. M. Barker**, J. V. Krogmeier, D. M. Bullock, "A Recursive Multi-Scale Correlation-Averaging Algorithm for Synchronization and Fusion of Independent Pavement Roughness Measurements," *IEEE Conference on Intelligent Transportation Systems* (2009).

- **A. M. Barker**, "A Distributed Road Condition Monitoring System for Vehicle Infrastructure Integration," M.S. Thesis, Purdue University, West Lafayette, IN, (May 2008).
- **A. M. Barker**, M. Ndoye, D. M. Bullock, and J. V. Krogmeier, "Opportunity to Leverage Vehicle Infrastructure Integration (VII) Data for Pavement Condition Monitoring," *Transportation Research Board*, *No. 0532*, TRB, National Research Council, Washington, D.C., (2008).
- W. Blokland, **A. M. Barker**, W. Grice, "Drift Compensation for the SNS Laserwire," *International Conference on Accelerator and Large Experimental Physics Control Systems (ICALEPCS),* Oak Ridge, TN (2007).
- **A. Barker**, "Laser Drift Feedback Control for SNS", SULI Student Poster, ORNL, TN, (2006).