Terry Ferrett

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Education

Ph.D. Electrical Engineering,   West Virginia University, Morgantown, Sept. 2008 - Dec. 2017
  Advisor: Matthew C. Valenti
  Thesis: Receiver Design for Physical-Layer Network Coding in the Two-Way Relay Channel

M. S. Electrical Engineering,   West Virginia University, Morgantown, Sept. 2005 - May 2008
  Advisor: Matthew C. Valenti
  Thesis: Data Recovery from Magnetic Media using Magnetic Force Microscopy

B. S. Electrical Engineering, B. S. Computer Engineering, Minor in Mathematics,
  West Virginia University, Morgantown,   Sept. 2000 - May 2005

Research Experience

Funded Projects

Survivable, Secure and Dependable Wireless Communications
Position: Post-Doctoral Fellow   *Sponsor*: Department of Defense, SBIR Contract FA8750-17-C-0285

- The overall project goal is to design, optimize and deliver a full-stack model of a rapidly-deployable mesh network for public-safety communications across all of Puerto Rico.

- My focus is on developing the PHY layer components, namely, designing waveforms for wideband communications over a multipath fading channel using SOQPSK-TG modulation, linear equalization, and LDPC channel coding in the presence of interference.

- Performance of the developed PHY layer components is simulated using MATLAB, C, Linux shell scripts, and a high-performance computer cluster.

- A novel iterative channel estimation technique was developed that dramatically improves error-rate performance.

- I served as the system administrator for the computing cluster used for simulation. The cluster is comprised of twenty-two physical servers, four-hundred processing cores and using Ubuntu Linux as the software environment.

Receiver Design for Physical-Layer Network Coding
Position: Research Assistant   *Sponsor*: National Science Foundation

- Developed system to *improve throughput for two-way relaying* by exploiting deliberate interference between multiple wireless transmitters in AWGN and fading channels.

- Deliberate interference yields a unique waveform requiring formulation of a novel relay receiver.

- System utilizes *noncoherent M-ary FSK modulation* to obviate need for carrier phase synchronization.

- Capacity-approaching error-rate performance is achieved by *iterative demodulation and channel coding*. Turbo codes, WiMAX LDPC, and DVB-S2 LDPC codes are considered. LDPC-coded performance at relay optimized using *EXIT charts*.

- System simulation time was reduced by running simulations on a *high-performance computing cluster* containing several hundred processing cores.

WebCML: A Web-Based Grid-Computing Resource for the Telecommunications Research Community
Position: Research Assistant   *Sponsor*: National Science Foundation

- Designed, physically built, installed the Linux operating system, and configured services on a 23-server, 408-core computing cluster.

- Developed software to execute general-purpose MATLAB code with emphasis on Monte Carlo simulation across multiple computing servers and processor cores.

A Cloud-Based Biometric Service Model for Iris and Ocular Recognition Using a Smartphone
Position: Research Assistant   *Sponsor*: National Science Foundation

- Developed software components for performing *biometric matching as a service* on a 23-server cloud computing infrastructure.

- Implemented Linux-based server-side software to automatically execute biometric matching on iris and ocular images uploaded by users from their smartphones.

- The server-side software uses *BASH, MATLAB* and *Java servlets hosted using Tomcat*.

- Enabled *rapid algorithm developer access* to the cloud infrastructure by designing and provisioning a Ubuntu-Linux based virtual machine containing all software and libraries required for development.

Retrieval and Reconstruction of Magnetic Data Using Scanning Probe Microscopy
Position: Research Assistant
Sponsor: Federal Government Contract No.: 2004*N975900*00

- Successfully recovered data from erased audio tapes using micrometer-scale microscopy images and signal processing techniques

- Created and simulated a micrometer-scale two-dimensional magnetic model of the magnetic particles in audio tapes to verify data collection techniques

Professional Experience

Position: Post-Doctoral Fellow   Jan. 2018 - Jan. 2019
Organization: WVU LCSEE, Morgantown, WV

- The project completed during this appointment is described in the section *Funded Projects - Survivable, Secure and Dependable Wireless Communications* above.

Position: Graduate Research Assistant   Sept. 2005 - May 2013, Aug. - Dec. 2017
Organization: Wireless Communications Research Laboratory, WVU, Morgantown, WV

- Projects completed as a Research Assistant are described in the section "Funded Projects" above.

Position: System Administrator - Student Worker   June 2013 - Aug. 2017
Organization: WVU LCSEE Systems

- Administered the computing infrastructure which supports all classroom and laboratory instruction in the Lane Department of Computer Science and Electrical Engineering.

- Infrastructure based on Ubuntu Linux, Microsoft Windows, and macOS, containing over *200 desktop computers*, *30 physical servers* and *80 virtual server instances*.

- Designed and implemented an automated server provisioning process based on Debian packaging, Git-and-Subversion based source control, and Ansible automated software installation.

- Updated site-wide technicial documentation and procedures to improve technician efficiency.

- Mentored junior technicians on fundamentals such as Ubuntu installation, GNU coreutils usage, source control using Git and Subversion, OSI model concepts and practical applications, and writing technicial documentation.

Position: Research Engineer   Apr. 2007 - Mar. 2008
Organization: Innovative Management and Technology Services

- Analyzed the performance of Monte-Carlo simulations executed on a public computing grid.

- Authored a Fortran-based simulation of phase-shift keyed digital modulation which utilized a computing cluster for parallel computation.

- Translated portions of an antenna optimization program from C++ to Java

- Mentored entry-level programmers writing public computing grid software.

Professional Associations and Services

Graduate Student Member, *Institute of Electrical and Electronics Engineers* (IEEE)

Peer reviewer for the following IEEE conferences

- International Conference on Communications (ICC)
- Military Communications Conference (MILCOM)
- Global Communications Conference (GLOBECOM)

Awards

Awarded the *NSF East Asia and Pacific Summer Institute* in 2011.

- Award provided ten weeks support to visit *Yokohama National University* in *Yokohama, Japan* as a visiting researcher.
- Collaboration with host professor on research related to my dissertation resulted in a conference publication (Item 7 in section Publications, below).

Publications

1. V. Talreja, T. Ferrett, M. C. Valenti and A. Ross, "Biometrics-as-a-service: A Framework to Promote Innovative Biometric Recognition in the Cloud," *Proc. IEEE Int. Conf. Consum. Electron.*, 2018.

2. M. C. Valenti and T. Ferrett, "Noncoherent LDPC-coded physical-layer network coding using multitone FSK," *IEEE Trans. Commun.*, 2018.

3. T. Ferrett and M. C. Valenti, "Noncoherent analog network coding using LDPC-coded FSK," *Proc. IEEE Int. Conf. on Commun.*, 2017.

4. T. Ferrett and M. C. Valenti, "Reduced Complexity Detection for Network-Coded Slotted ALOHA using Sphere Decoding," *Proc. Asilomar Conf. on Signals Syst. and Comput.*, 2015.

5. T. Ferrett and M. C. Valenti, "LDPC Code Design for Noncoherent Physical Layer Network Coding," *Proc. IEEE Int. Conf. on Commun.*, 2015.

6. T. Ferrett and M. C. Valenti, "An iterative noncoherent relay receiver for the two-way relay channel," *Proc. IEEE Int. Conf. on Commun.*, 2013.

7. T. Ferrett, H. Ochiai and M. Valenti, "Physical-layer Network Coding using FSK Modulation under Frequency Offset," *Proc. IEEE Veh. Technol. Conf.*, 2012.

8. T. Ferrett M. C. Valenti and D. Torrieri, "Noncoherent Digital Network Coding Using Multi-tone CPFSK Modulation," *Proc. IEEE Military Commun. Conf.*, 2011.

9. M. C. Valenti, D. Torrieri and T. Ferrett, "Noncoherent physical-layer network coding with FSK modulation: Relay receiver design issues," *IEEE Trans. Commun.*, 2011.

10. T. Ferrett, M. C. Valenti and D. Torrieri, "Receiver Design for Noncoherent Digital Network Coding," *Proc. IEEE Military Commun. Conf.*, 2010.

11. M. C. Valenti, D. Torrieri and T. Ferrett, "Noncoherent Physical-Layer Network Coding Using Binary CPFSK Modulation," *Proc. IEEE Military Commun. Conf.*, 2009.