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T. Charles Clancy, PhD

Personal Summary

Dr. Charles Clancy is a successful academic executive, research innovator, and entrepreneur who currently directs Virginia Tech's Hume Center. He joined Virginia Tech to help launch the Hume Center in 2010 and bootstrapped its growth with the award of \$100M in grants and contracts to now support over 75 professors, researchers, and staff, and engage over 400 students per year in national security and cybersecurity programs. Additionally he has worked with the venture community to spin four companies off from the university that have raised over \$100M since 2012. These enterprises have created over 200 jobs from Blacksburg to Boston.

Clancy is an internationally-recognized expert in wireless security, and has led ground-breaking programs in spectrum security, cryptographic authentication, and physical-layer resilience. He is currently working on security for IoT and 5G. He serves in leadership roles within the IEEE Communication Society (COMSOC) and Signal Processing Society (SPS), and has served on the editorial boards for *IEEE Transactions on Information Forensics and Security (TIFS)* and *IEEE Transactions on Cognitive Communications and Networking (TCCN)*. He is co-author to five books, over 20 patents, and over 200 academic publications.

Education

University of Maryland, College Park, MD

Ph.D., Computer Science

2006

University of Illinois, Urbana-Champaign, IL

M.S., Electrical Engineering

2002

Rose-Hulman Institute of Technology, Terre Haute, IN

B.S., Computer Engineering

2001

Experience

Virginia Tech, Arlington, VA

Director, Hume Center for National Security and Technology

2011–present

Professor, Electrical and Computer Engineering

2017–present

Associate Professor, Electrical and Computer Engineering

2011–2017

Associate Director, Hume Center for National Security and Technology

2010–2011

Laboratory for Telecommunications Sciences, College Park, MD

Engineering Leader, Emerging Mobile Technologies

2008–2010

Senior Researcher, Emerging Mobile Technologies

2006–2008

Researcher, Emerging Mobile Technologies

2004–2006

Summer Hire, Engineering Internship Program

2000–2004

University of Maryland, College Park, MD

Adjunct Assistant Professor, Electrical and Computer Engineering

2007–2010

Affiliate Researcher, UM Institute for Advanced Computer Studies

2003–2010

Graduate Research Assistant, Computer Science

2004–2005

Graduate Teaching Assistant, Computer Science

2003–2004

University of Illinois, Urbana-Champaign, IL

Graduate Research Assistant, Electrical and Computer Engineering

2002–2003

Graduate Teaching Assistant, Electrical and Computer Engineering

2001–2002

Indiana University/Purdue University, Indianapolis, IN

Adjunct Instructor, Office of Continuing Studies

2001–2003

Software Engineer, Community Learning Network

1998–2003

Rose-Hulman Institute of Technology, Terre Haute, IN

<i>UNIX Systems Architect</i> , Instructional and Administrative IT	2001
<i>Systems Administrator and Webmaster</i> , Department of Mathematics	2000–2001
<i>Systems and Network Administrator</i> , Department of Computer Science	1998–2001

Awards

<i>Innovation Award (HawkEye 360)</i> , Washington Business Journal	2017
<i>Fierce Innovation Awards (Federated Wireless)</i> , FierceWireless	2016
<i>40 Under 40 Honoree</i> , Leadership Arlington	2015
<i>Deans Award for Research Excellence</i> , Virginia Tech College of Engineering	2014
<i>L-3 Communications Faculty Fellowship</i> , Virginia Tech College of Engineering	2013
<i>GAP-50 Finalist (Entrepreneurship Award)</i> , Commonwealth of Virginia	2012
<i>Secretary of Defense Medal for the Global War on Terrorism</i> , Department of Defense	2011
<i>Best Student Paper Runner Up</i> , IEEE Workshop on Signal Processing Systems	2011
<i>Senior Member Status</i> , Institute of Electrical and Electronics Engineers	2010
<i>Letter of Commendation</i> , United States Forces Iraq J6	2010
<i>Outstanding Paper Award</i> , SDR Forum Technical Conference	2007
<i>Joint Meritorious Unit Award</i> , Department of Defense	2007
<i>Outstanding Paper Award</i> , SDR Forum Technical Conference	2006
<i>Deckert-Foster Engineering Award</i> , Department of Defense	2006
<i>Best Paper Award</i> , Virginia Tech Wireless Symposium	2006
<i>Joint Meritorious Unit Award</i> , Department of Defense	2004
<i>Graduate Fellowship</i> , University of Maryland, Department of Computer Science	2003

Professional Societies

Institute for Electrical and Electronics Engineers (IEEE)

Membership Levels

<i>Senior Member</i> , IEEE	2010–present
<i>Member</i> , IEEE	2006–2010
<i>Student Member</i> , IEEE	2003–2006

Society Membership

<i>Member</i> , IEEE Signal Processing Society	2012–present
<i>Member</i> , IEEE Communications Society	2010–present

Technical Committee Membership

<i>Elected Member</i> , Information Forensics and Security (IFS-TC)	2013–present
<i>Voting Member</i> , Technical Committee on Cognitive Networks (TCCN)	2013–present
<i>Member</i> , Comms and Information Security (CISTC)	2011–present

Technical Committee Assignments

<i>Education Committee Chair</i> , IFS-TC	2015–present
<i>Awards Committee Member</i> , IFS-TC	2015–present
<i>Communications Security Area Chair</i> , IFS-TC	2014–present
<i>North America Regional Representative</i> , IFS-TC	2014
<i>Member</i> , Technical Directions, IFS-TC	2014
<i>Vice Chair</i> , TCCN Cognitive Network Security Special Interest Group	2013–present

Armed Forces Communications and Electronics Association (AFCEA)

<i>Member</i> , AFCEA	2012–present
<i>Elected Member</i> , AFCEA Intelligence Committee	2015–present

Journal Editorships

<i>Editor</i> , IEEE Transactions on Cognitive Communications and Networks	2014–2017
<i>Associate Editor</i> , IEEE Transactions on Information Forensics and Security	2012–2015

Conference Leadership

Conference Leadership

<i>Co-Organizer</i> , AFCEA/INSA National Security Summit	2017
<i>Co-Organizer</i> , AFCEA Intelligence Symposium	2016

<i>Workshop Co-Chair, IEEE Personal, Indoor and Mobile Radio Comms (PIMRC)</i>	2014
<i>TPC Co-Chair, IEEE Dynamic Spectrum Access Networks (DySPAN)</i>	2014
<i>Patron Co-Chair, IEEE Communication and Network Security (CNS)</i>	2013
<i>Co-Chair, ACM Cognitive Radio Architectures for Broadband (CRAB) Workshop</i>	2013
<i>Co-Chair, IEEE Security in Communications Networks Workshop</i>	2012
<i>TPC Co-Chair, IEEE ICC Cognitive Radio Networks Symposium</i>	2012
<i>Co-Chair, Open Source Workshop, Wireless Innovation Forum</i>	2011
<i>Co-Chair, SDR Forum Open Source Workshop</i>	2011
<i>Tutorial Chair, Virginia Tech Wireless Symposium and Summer School</i>	2011
<i>Chair, GNU Radio Future Directions Workshop</i>	2009, 2010
<i>General Chair, WLAN/WMAN Symposium, Department of Defense</i>	2006, 2008

Technical Program Committee Member

IEEE Wireless Wireless for Space and Extreme Environments (WiSEE)	2018
IEEE Dynamic Spectrum Access Networks (DySPAN)	2017, 2018
IEEE Military Communications Conference (MILCOM)	2014, 2015, 2016, 2017
IEEE Intl Workshop on Information Forensics and Security (WIFS)	2015, 2016, 2017
IEEE Vehicular Technologies Conference (VTC)	2017
IEEE Intl Conference on Acoustics, Speech and Signal Proc (ICASSP)	2014, 2015, 2016
Workshop on Security in Cloud Computing, ACM AsiaCCS	2015
IEEE Intl Conference on Computing, Networking and Comms (ICNC)	2015
IEEE Cognitive Radio and Electromagnetic Spectrum Security (CRESS)	2014
IEEE Global Conference on Signal and Infor Processing (GlobalSIP)	2013, 2014
IEEE Global Communications Conference (GLOBECOM)	2012, 2014
Conference on Decision and Game Theory for Security (GameSec)	2011
ICST Security in Emerging Wireless Comms and Networking Systems	2009

Standards Bodies

<i>Steering Group Member, WinnF Spectrum Sharing Committee (SSC)</i>	2014–present
<i>Chair, WinnF SSC Security Working Group</i>	2014–present
<i>Vice Chair, DoD IEEE 802.16 Secure Profile Working Group</i>	2009–2010
<i>Chair, Security Task Force, DoD IEEE 802.16 Secure Profile Working Group</i>	2009–2010
<i>Member, WinnF Educational Working Group</i>	2007–2010
<i>Co-Chair, IETF Handover Keying Working Group</i>	2006–2009
<i>Member, IETF Security Directorate</i>	2006–2009
<i>Security Advisor, IETF CAPWAP Working Group</i>	2006–2008
<i>Security Advisor, IETF Extensible Authentication Protocol Working Group</i>	2005–2007
<i>Member, IEEE 802.22 Spectrum Sensing Task Force</i>	2005–2006

Professional Service

<i>Star Mentor, Mach37 Cybersecurity Incubator</i>	2014–present
<i>Member, STEM Committee, Fairfax County Public Schools</i>	2013–present
<i>Member, JCOTS Cyber Security Panel, Virginia General Assembly</i>	2012–present
<i>Co-Director, NSF Security and Software Engineering Research Center</i>	2011–present
<i>Member, JIEDDO Enduring Capabilities Working Group</i>	2012
<i>Review Panel Member, National Science Foundation</i>	2010
<i>Steering Committee, NSF EARS Workshop</i>	2010
<i>Amateur Radio Operator, American Radio Relay League</i>	2001–present

University Service

Committees and Advisor Roles	
<i>Stakeholders Committee, Integrated Security Destination Area</i>	2016–present
<i>Chair, Research Subcommittee, Integrated Security Destination Area</i>	2016–present
<i>Co-Chair, Development Subcommittee, Integrated Security Destination Area</i>	2016–present
<i>Faculty Design Team, Integrated Security Destination Area</i>	2016
<i>Steering Group, Integrated Security Destination Area</i>	2015–2016
<i>Network Inf and Services Advisory Committee, VP for IT</i>	2011–present
<i>Networks Area Committee, Electrical and Computer Engineering</i>	2012–present

<i>Communications Area Committee, Electrical and Computer Engineering</i>	2011–present
<i>Scholarship Selection Committee, Hume Center</i>	2010–present
<i>Faculty Advisor, Student Cybersecurity Club</i>	2011–2014
<i>Area Recruiting Representative, Communications Area, ECE</i>	2012–2013
<i>Review Panel Member, ICTAS Joint Faculty Collaborative Program</i>	2011

Faculty Search Committees

<i>Chair, Collegiate Prof, Machine Learning</i>	2017–2018
<i>Member, Dean, College of Engineering</i>	2016–2017
<i>Chair, Director, Information Systems Lab, Hume Center</i>	2016
<i>Member, Asst Prof, Cyber-Physical Security, Computer Engineering</i>	2015–2016
<i>Chair, Assoc Director for Info Systems, Hume Center</i>	2015
<i>Member, Vice President, National Capital Region</i>	2013
<i>Member, Associate Vice President, National Capital Region</i>	2013
<i>Chair, Asst Prof, Software Security, Computer Engineering</i>	2012–2013
<i>Chair, Portfolio Director, Hume Center</i>	2012
<i>Member, Asst Prof, Software Security, Computer Engineering</i>	2011–2012
<i>Member, Asst Prof, Cyber Security, Computer Science</i>	2010–2011

Entrepreneurship and Consulting

<i>Co-Founder, HawkEye 360 Inc</i>	2015–present
<i>Co-Founder, Federated Wireless Inc</i>	2012–present
<i>Co-Founder, Optio Labs Inc</i>	2012–2017
<i>President and Founder, Stochastic Research LLC</i>	2009–present
<i>Advisory Board Member, DeepSig</i>	2017–present
<i>Advisory Board Member, Votem Inc</i>	2015–2016
<i>Consultant, Barr Group Inc</i>	2013–2014
<i>Consultant, Center for Innovative Technologies</i>	2011
<i>Consultant, Chemring North America</i>	2014
<i>Consultant, CTIA – The Wireless Association</i>	2013–present
<i>Consultant, Eogogics Inc</i>	2011–2013
<i>Consultant, FastIraq Inc</i>	2010–2011
<i>Consultant, IDA Center for Computer Sciences</i>	2010–2013
<i>Consultant, Litmore LLC</i>	2012
<i>Consultant, Lyric Semiconductor</i>	2010–2011
<i>Consultant, Millennium Space Systems</i>	2014–2015
<i>Consultant, Office of the Secretary of Defense</i>	2013–2016
<i>Consultant, Netgear</i>	2011–2012
<i>Consultant, WAA Associates LLC</i>	2003–2005

Teaching

Curriculum Development

<i>Cyber Security Graduate Certificate, Virginia Tech, College of Engineering</i>	2013
<i>Cyber Security Undergraduate Minor, Virginia Tech, College of Engineering</i>	2012
<i>Cyber Security Seminar, Virginia Tech, Electrical and Computer Engineering</i>	2011
<i>Information and Network Security, University of Maryland, MS Telecomms</i>	2008

University Courses

<i>CyberLeaders Capstone (SPIA 4984), Virginia Tech</i>	2017
<i>Telecommunication Networks (ECE 4614), Virginia Tech</i>	2011, 2013, 2016
<i>Network Security (ECE/CS 5584), Virginia Tech</i>	2015
<i>Network Architecture and Protocols II (ECE/CS 5566), Virginia Tech</i>	2012
<i>Special Study: Control Theory and the Dynamics of Cybersecurity, Virginia Tech</i>	2014
<i>Network Architecture and Protocols I (ECE/CS 5565), Virginia Tech</i>	2013
<i>Information Theory (ECE 5634), Virginia Tech</i>	2011
<i>Communications Networks (ENEE 426), University of Maryland</i>	2008, 2009
<i>Information and Network Security (ENTS 689i), University of Maryland</i>	2008
<i>Teaching Assistant, Cryptology (CMSC 456), University of Maryland</i>	2003

Teaching Assistant, Communication Networks (ECE 438), University of Illinois 2001

Short Courses, Seminars, and Tutorials

Numerical Methods and Analysis (40 hours), Navy SPAWAR Atlantic 2015
 Cybersecurity Technologies and Tactics (8 hours), Fujitsu Ltd 2014
 Cellular Core Networks (40 hours), US Special Operations Command (SOCOM) 2012
 Wireless Comms and Security (40 hours), Office of the Secretary of Defense 2012
 Android Security (6 hours), L-3 Communications 2012
 Cyberwarfare Strategy (6 hours), Joint Inter-American Defense College 2011, 2012
 Security for Tactical Wireless (4 hours), VT Wireless Summer School 2011
 Wireless 4G Communications (8 hours), ProObject Speaker Series 2010
 Intro to WLAN Security (8 hours), DOD Cryptanalytic Program 2005, 2006, 2008, 2009
 Wireless Networks (24 hours), DOD Resident Signal Engineers Program 2007
 Software-Defined and Cognitive Radio (4 hours), IEEE MILCOM 2007
 UNIX Systems Admin using Solaris (16 hours), Indiana University 2001, 2002, 2003
 Computer and Network Security (16 hours), Indiana University 2001

Sponsored Research

\$37M in Total Grant/Contract Awards

1. T. Clancy, C. Headley, "Cyber Adversarial Awareness and Modeling based on Electromagnetic Sensing," Office of Naval Research (ONR), **\$100K**, 2018–2019
2. T. Clancy, J. Graham, K. Karra, N. Ramakrishnan, "Anticipatory SIGINT and Activity Prediction," Intelligence Advanced Research Projects Agency (IARPA), with STR and USC-ISI, **\$367K**, 2018–2019
3. T. O'Shea, T. Clancy, "Machine Learning for Cyber Awareness and Defense," Virginia Research Investment Fund, **\$1,181K**, 2018–2020
4. J. Black, T. Clancy, A. Michaels, R. McGwier, J. Ernst, M. Fowler, C. Headley, "Disaggregated Communications for Smallsat Clusters," sensitive sponsor, **\$1,241K**, 2018–2019
5. J. Black, T. Clancy, R. McGwier, C. Headley, "OpenCPI Middleware for the AstroSDR Payload," sensitive sponsor, **\$750K**, 2018–2019
6. C. Williams, T. Clancy, T. O'Shea, "Anomaly Analysis in Additive Manufacturing Design," sensitive sponsor, **\$1,485K**, 2017-2018
7. T. Clancy, P. Schaumont, "Security and Software Engineering Research Center @ Virginia Tech – Phase II," National Science Foundation (NSF), **\$300K**, 2017-2020
8. J. Black, T. Clancy, A. Wicks, M. Fowler, "Integrated Cognition for Electromagnetic Squad Defense," Defense Advanced Research Projects Agency (DARPA/TTO), with CACI, **\$1,552K**, 2017-2019
9. T. Clancy, S. Rahman, "Mapping Industrial Control Systems," Office of the Secretary of Defense, **\$150K**, 2016-2017
10. T. Clancy, "Analyzing End-to-End Encryption with Deep Learning," NSF Security and Software Engineering Research Center, **\$50K**, 2016-2017
11. T. Clancy, T. O'Shea, "Deep Learning-Based RF Emitter Characterization," Lockheed Martin Corporation, **\$300K**, 2016-2018
12. T. Chantem, E. Tilevich, T. Clancy, "Compiler Tools for Critical Program Information Protection," Office of the Secretary of Defense, **\$500K**, 2016-2018
13. A. Abdelhadi, T. Clancy, "Security Analysis of Wireless Connections for Remote Sensors," Airbus, **\$40K**, 2015-2017
14. A. Abdelhadi, T. Clancy, "Attack Detection Methods for Threats Coming from the IoT," Airbus, **\$40K**, 2015-2017

15. T. Clancy, J. Black, N. Ramakrishnan, M. Marathe, "SIGINT-based Anticipation of Future Events," Intelligence Advanced Research Projects Activity (IARPA), with USC-ISI, Next Century, and Draper Labs, **\$1,082K**, 2016-2017
16. A. Michaels, T. Clancy, J. Ernst, R. McGwier, "Tackling WiFi Interference and Co-Channel Excision," sensitive sponsor, **\$1,396K**, 2015-2016
17. T. Clancy, T. OShea, J. Black, "Distributed Coordination among Tactical Electronic Warfare Platforms," Defense Advanced Research Projects Agency (DARPA/TTO), with CACI, **\$1,968K**, 2015-2017
18. T. Clancy, T. OShea, "Bayesian Algorithms for Pattern of Life Estimation and Forecasting in RF Environments," sensitive sponsor, **\$755K**, 2015-2018
19. T. Clancy, "Closed-Loop Cognitive Electronic Warfare Operations with Cyber Feedback," Office of Naval Research (ONR), **\$694K**, 2015-2016
20. J. Tront, T. Clancy, "Virginia Tech GenCyber Summer Camp," National Security Agency (NSA), **\$100K**, 2015
21. T. Clancy, R. McGwier, "Mission Feasibility Study and Prototyping for Software Radio Waveforms," sensitive sponsor, **\$1,392K**, 2014-2016
22. T. Clancy, M. Fowler, "Heterogeneous Parallel Mobile Computing for Cognitive Electronic Warfare," Office of Naval Research (ONR), **\$894K**, 2014-2016
23. T. Clancy, "Exploitation of Android Ad Libraries," L-3 Communications, **\$44K**, 2014-2015
24. T. Clancy, "Machine Learning for Target Models in Cognitive Electronic Warfare," L-3 Communications, **\$42K**, 2014-2015
25. T. Clancy, R. McGwier, "Resilient Tactical SATCOM Using Cognitive Radio: Phase 2," Air Force Research Labs (AFRL), with Shared Spectrum Company, **\$293K**, 2014-2015
26. J. Tront, T. Clancy, K. Cooper, "Virginia Tech CyberCorps: Federal Scholarship for Service," National Science Foundation (NSF), **\$3,909K**, 2013-2018
27. R. McGwier, T. Clancy, "Experimental Software Defined Radio," Harris Corporation, **\$110K**, 2014
28. T. Clancy, A. Abdelhadi, R. McGwier, "Spectral Coexistence using MIMO Radar Platforms," Defense Advanced Research Projects Agency (DARPA/STO), **\$349K**, 2013-2014
29. R. McGwier, T. Clancy, "Tactical Platforms for Advanced Electronic Warfare," Air Force Research Labs (AFRL), **\$498K**, 2013-2014
30. T. Clancy, R. McGwier, "Satellite Communications using DSA under Spectral Uncertainty," Air Force Office of Scientific Research (AFOSR), with Shared Spectrum Company, **\$56K**, 2013-2014
31. R. Tandon, T. Clancy, "Physical Layer Security: Information Theoretic Approach to Jamming," L-3 Communications, **\$237K**, 2013-2014
32. S. Shukla, T. Clancy, "Application-Specific Firewall Synthesis Tool for High-Assurance Systems," L-3 Communications, **\$162K**, 2013-2014
33. S. Sodagari, T. Clancy, "Using Asynchronous Weak-Commitment Search for Distributed Constraint Satisfaction for Autonomous Network Management," Office of Naval Research (ONR), **\$75K**, 2013-2015.
34. P. Athanas, T. Clancy, "Novel Applications of FPGA Logic," Air Force Research Labs (AFRL), with USC Information Sciences Institute, **\$994K**, 2013-2014

35. P. Athanas, R. Buehrer, R. McGwier, J. Reed, T. Clancy, "Software Defined Radio Technology Development," sensitive sponsor, **\$955K**, 2012-2015
36. T. Clancy, "Advanced Threat Development for Cognitive Electronic Warfare Platforms," Defense Advanced Research Projects Agency (DARPA/I2O), with MIT Lincoln Labs, **\$300K**, 20122013
37. T. Clancy, "Distributed/Cognitive EW for Agile/Adaptive Systems," Air Force Research Labs (AFRL), with MacAulay Brown, **\$142K**, 20122013
38. R. McGwier, T. Clancy, P. Athanas, J. Reed, R. Buehrer, A. Beex, "Advanced Wideband Systems and Technologies," sensitive sponsor, **\$8,690K**, 20122015
39. T. Clancy, R. McGwier, J. Reed, "Sharing and Shaping 4G Cellular Resources," Allied Minds Federal Innovations, **\$425K**, 20122013
40. J. White, C. Dietrich, J. Reed, T. Clancy, R. McGwier, "Software Defined Radio Deployment Optimization," sensitive sponsor, **\$205K**, 20122013
41. S. Sodagari, T. Clancy, R. McGwier, "Resilient Tactical SATCOM Using Cognitive Radio: Phase 1," Air Force Research Labs (AFRL), with Shared Spectrum Company, **\$40K**, 2012
42. T. Clancy, "Security and Robustness of TD-LTE for Public-Safety Communications," NSF Security and Software Engineering Research Center (S2ERC), **\$20K**, 2012
43. T. Clancy, D. Yao, M. Hsiao, J. Park, J. Tront, "S2ERC @ Virginia Tech Cyber Security Industry/University Cooperative Research Center," National Science Foundation (NSF), **\$325K**, 2011-2016
44. T. Clancy, R. McGwier, S. Sodagari, "Spectral Coexistence through Cognitive Radar," Office of Naval Research (ONR), with Shared Spectrum Company, **\$1,482K**, 2011-2014
45. T. Clancy, "Cognitive Electronic Warfare," Naval Research Laboratory (NRL), **\$297K**, 2011-2014
46. T. Clancy, "Android Smartphone System Security," L-3 Communications, **\$318K**, 2011-2012
47. T. Clancy, "High Performance IPv6 Security Gateway," Department of Homeland Security (DHS), with Centripetal Networks Inc, **\$35K**, 2011-2012
48. T. Clancy, "Android Operating System Security," Naval Postgraduate School (NPS), **\$109K**, 2011-2012
49. R. McGwier, T. Clancy, B. Agee, "Low-Cost Communications Satellite Design," Los Alamos National Labs (LANL), **\$292K**, 2011-2012
50. T. Clancy, R. Buehrer, "Cellular Network Security Research," Aerospace Corporation, **\$129K**, 2011-2012
51. T. Clancy, "Mobility and Spectrum Security Strategy and Policy," Office of the Assistant Secretary of Defense and Chief Information Officer (DOD CIO), with JHU Applied Physics Laboratory, **\$250K**, 2011-2012
52. T. Clancy, "Secure Spectrum Access Policy Research," Defense Advanced Research Programs Agency (DARPA/STO), with Shared Spectrum Company, **\$50K**, 2011-2012
53. T. Clancy, "Mobile Wireless Communications Research," JHU Applied Physics Laboratory (APL), **\$35K**, 2011
54. T. Clancy, "Cognitive Electronic Warfare," Virginia Tech Institute for Critical Technologies and Applied Sciences (ICTAS), **\$40K**, 2011

Research Agreements

55. T. Clancy, "Dynamic Spectrum Access Security Study," Office of the Assistant Secretary of Defense for Networks and Information Integration (ASD-NII), with Shared Spectrum Company, **\$150K**, 2010-2011

IDIQ Contract Vehicles

1. US CYBERCOM, *Omnibus R&D*, subcontractor to SAIC, 2016–2021
2. Defense Intelligence Agency, *DORE*, subcontractor to CACI, 2015–2020
3. Defense Technical Information Center, *Cybersecurity Technical Area Task (CS-TAT)*, subcontractor to Macaulay Brown, 2015–2021
4. Defense Intelligence Agency, *E-SITE*, subcontractor to CACI and Occam, 2014–2019
5. US Army TACOM, *Omnibus III*, subcontractor to Leidos, 2014–2018
6. Air Force Research Labs, *ANSWER Program*, subcontractor to Macaulay Brown, 2014–2019
7. Air Force Research Labs, *SMIRF Program*, subcontractor to Macaulay Brown, 2014–2019
8. US Army CERDEC, *TAOSS Program*, subcontractor to Systek, 2013–2018
9. Air Force Research Labs, *Agile Cyber Technologies*, subcontractor to L-3 Communications, 2012–2018
10. Air Force Research Labs, *IDARE Program*, subcontractor to Macaulay Brown, 2012–2017

Cooperative Research and Partnership Agreements

1. US Army CERDEC, *Cyber Operations*, CRADA, 2011–2021
2. CACI, *UAS Cybersecurity Research*, Partnership Agreement, 2015–2019
3. Center for Innovative Technologies, *Mach37 Accelerator Testbed Support*, Partnership Agreement, 2013–2016
4. Defense Intelligence Agency, *Science and Technology Research*, CRADA, 2013–2016
5. National Intelligence University, *Cyber Education*, Partnership Agreement, 2012–2015
6. L-3 Communications, *National Security Research*, Partnership Agreement, 2011–2015

Current Students

PhD Students

Dane Brown	2014–present
Tugba Erpek	2013–present
Michael Fowler (co-advised with R. Williams)	2012–present
Seth Hitefield (co-advised with A. Butt)	2012–present
Jason McGinthy (co-advised with A. Michaels)	2016–present
John Narayan	2014–present
Kevin Ryland	2017–present

Masters Students (with thesis)

Steven Hauser	2016–present
Robert Smith	2015–present
Charles Suslowicz	2016–present

Students Graduated

Masters Students (non-thesis)

Aaron Dougherty	2016–present
Yadu Raghu	2017–present
Korey Weeks	2015–present

PhD Students

1. Amr Abed, “Securing Cloud Containers through Intrusion Detection and Remediation,” PhD ECE, Virginia Tech, 2017
2. Mohamed Ghorbanzadeh, “Resource Allocation and End-to-End Quality of Service for Cellular Communications Systems in Congested and Contested Environments,” PhD ECE, Virginia Tech, 2015
3. Nathan Goergen (co-advised with R. Liu), “Extrinsic Channel-Like Fingerprinting for Transmitter Authentication in Wireless Systems,” PhD ECE, University of Maryland, 2011
4. Awais Khawar, “Spectrum Sharing between Radar and Communication Systems,” PhD ECE, Virginia Tech, 2015
5. Akshay Kumar (co-advised with R. Tandon), “Efficient Resource Allocation Schemes in Wireless Networks with Diverse Quality-of-Service Requirements,” PhD ECE, Virginia Tech, 2016
6. Matt La Pan, “Security Issues for Modern Communications Systems: Fundamental Electronic Warfare Tactics for 4G Systems and Beyond,” PhD ECE, Virginia Tech, 2014
7. Jasmin Mahal, “Analysis of Jamming-Vulnerabilities and Antijam-Capabilities of Modern Wireless Communication Systems,” PhD ECE, Virginia Tech, 2018
8. Tim O’Shea, “Learning from Data in Radio Algorithm Design,” PhD ECE, Virginia Tech, 2017
9. Wile Sehery, “OneSwitch Data Center Architecture,” PhD ECE, Virginia Tech, 2018
10. Avik Sengupta (co-advised with R. Tandon), “Fundamentals of Cache Aided Wireless Networks,” PhD ECE, Virginia Tech, 2016
11. Chowdhury Shahriar, “Resilient Waveform Design for OFDM-MIMO Communication Systems,” PhD ECE, Virginia Tech, 2015
12. Haya Shajaiah, “Resource Allocation with Carrier Aggregation for Spectrum Sharing in Cellular Networks,” PhD ECE, Virginia Tech, 2016
13. Wile Sehery, “OneSwitch Data Center Architecture,” PhD ECE, Virginia Tech, 2018

Masters Students (with thesis)

1. Yang Chen, “Robust Prediction of Large Spatio-Temporal Datasets,” MS CS, Virginia Tech, 2013
2. Kiran Karra, “Wireless Distributed Computing on the Android Platform,” MS ECE, Virginia Tech, 2012
3. Awais Khawar, “Spectrum Sensing Security in Cognitive Radio Networks,” MS ECE, University of Maryland, 2010
4. Neelima Krishnan, “Android Hypovisors: Securing Mobile Devices through High-Performance, Light-Weight, Subsystem Isolation with Integrity Checking and Auditing Capabilities,” MS CS, Virginia Tech, 2014
5. Rebecca Kurrle, “Resource Allocation for Smart Phones in 4G LTE-Advanced Carrier Aggregation,” MS ECE, Virginia Tech, 2012

6. Marc Lerch, "Using Decoys as a Resiliency Mechanism in Spectrally Harsh DSA Environments," MS ECE, Virginia Tech, 2014
7. Zhongmin Ma, "Android Application Install-time Permission Validation and Run-time Malicious Pattern Detection," MS ECE, Virginia Tech, 2013
8. Andrew Pham, "An Implementation of Utility-Based Traffic Shaping on Android Devices," MS ECE, Virginia Tech, 2014
9. Kevin Ryland, "Software-Defined Radio Implementation of Two Physical Layer Security Techniques," MS ECE, Virginia Tech, 2017
10. David Sowers, "Architecture for Department of Defense Mobile Derived Credentials," MS ECE, Virginia Tech, 2014
11. Jeremy Tate, "Security Weaknesses of the Android Advertising Ecosystem," MS ECE, Virginia Tech, 2014

Masters Students (non-thesis)

1. Joel Anderson, "OP-TEE Structured Data Extension," MEng, ECE, Virginia Tech, 2018
2. Timothy Buttner, "RF Network on Chip (RF-NoC) based Polyphase Filter Bank Implementation," MEng ECE, Virginia Tech, 2015
3. Kristina Freeman, "Applying Cognitive Radio Techniques in 5G Wireless," MEng ECE, Virginia Tech, 2012
4. Robert Horst, "Security in the LTE S1-MME Link," MEng ECE, Virginia Tech, 2014
5. Tyler Howell, "Influence of Concurrent Processing in a Microcontroller on AES Correlation Power Analysis Side Channel Attack," MEng ECE, Virginia Tech, 2015
6. James Massey, "Implementation of a Software-Based GPS Receiver," MEng ECE, Virginia Tech, 2014
7. John Narayan, "Mitigating Effects of Bit Errors on Block Cipher Encrypted Wireless Data Links," MEng ECE, Virginia Tech, 2013
8. Peter Nguyen, "Implementation of an Open Source LTE eNodeB," MEng ECE, Virginia Tech, 2016
9. Kruti Pandya, "Survey of Different Dirty Paper Coding Methods," MEng ECE, Virginia Tech, 2013
10. Tejas Patel, "MaxWell Lab – Over-the-Air Testbed for IEEE 802.16e," MS Telecommunications, University of Maryland, 2008
11. Casandra Robinson, "Security in Autonomy: A Review of Security Considerations in Autonomous Systems," MEng ECE, Virginia Tech, 2017
12. Ruth Stoehr-Filipiak, "Algorithm and Performance Comparison of Convolutional Turbo Codes and Low-Density Parity Check Codes," MEng ECE, Virginia Tech, 2016

Publication Summary

Statistics on Publications

5	Books
61	Journal Papers
140	Conference Papers
5800+	Total Citations
37	H-Index
111	i10-Index

Books

Published Monographs

1. H. Shajaiah, A. Abdelhadi, T. Clancy, *Resource Allocation with Carrier Aggregation in Cellular Networks: Optimality and Spectrum Sharing*, Springer, 201 pages, 2018
2. A. Khawar, A. Abdelhadi, T. Clancy, *Spectrum Sharing between Radars and Communication Systems*, Springer, 102 pages, 2017
3. M. Ghorbanzadeh, A. Abdelhadi, T. Clancy, *Cellular Communications Systems in Congested Environments: Resource Allocation and End-to-End Quality of Service*, Springer, 247 pages, 2017
4. A. Khawar, A. Abdelhadi, T. Clancy, *MIMO Radar Waveform Design for Spectrum Sharing with Cellular Systems: A MATLAB Based Approach*, Springer, 59 pages, 2016

Monographs in Press

1. A. Kumar, A. Abdelhadi, T. Clancy, *Design and Implementation of Practical Schedulers for M2M Uplink Networks Using MATLAB*, Springer, in press

Book Chapters

1. A. Abdelhadi, T. Clancy, "Application-Aware Spectrum Sharing," in *Handbook of Cognitive Radio*, Springer, available online, 2017

Under Submission

1. A. Kumar, A. Abdelhadi, T. Clancy, "A Delay Optimal Multiclass Packet Scheduler for Generic M2M Uplink," *IEEE Internet of Things Journal*, under submission
2. A. Sengupta, S. Amuru, R. Tandon, R. Buehrer, T. Clancy, "Learning-Aided Collaborative Caching in Small Cell Networks," *IEEE/ACM Transactions on Networking*, under submission
3. M. Azab, A. Abed, T. Clancy, "Resilient Intrusion Detection System for Cloud Containers," *Elsevier Digital Investigation*, under submission

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1. H. Shajaiah, A. Abdelhadi, T. Clancy, "An Optimal Strategy for Determining True Bidding Values in Secure Spectrum Auctions," *IEEE Systems Journal*, to appear
2. T. O'Shea, T. Clancy, K. Karra, "Radio Modulation Recognition Using Neural Networks Based Feature Learning," *Springer Neural Computing and Applications Journal*, to appear
3. H. Shajaiah, A. Abdelhadi, T. Clancy, "Robust Resource Allocation with Joint Carrier Aggregation in Multi-Carrier Cellular Networks," *IEEE Transactions on Cognitive Communications and Networking*, available online
4. M. Lichtman, M. Vondal, T. Clancy, J. Reed, "Antifragile Communications," *IEEE Systems Journal*, available online
5. T. O'Shea, T. Roy, T. Clancy, "Over the Air Deep Learning Based Radio Signal Classification," *IEEE Journal of Selected Topics in Signal Processing*, vol. 12, (1), February 2018
6. W. Sehery, T. Clancy, "Flow Optimization in Data Centers with Clos Networks in Support of Cloud Applications," *IEEE Transactions on Network and Service Management*, vol. 14, (4), December 2017

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7. M. Ghorbanzadeh, A. Abdelhadi, T. Clancy, "Application-Aware Resource Allocation of Hybrid Traffic in Cellular Networks," *IEEE Transactions on Cognitive Communications and Networking*, vol. 3, (2), pp. 226–241, June 2017
8. A. Kumar, R. Tandon, T. Clancy, "On the Latency and Energy Efficiency of Distributed Storage Systems," *IEEE Transactions on Cloud Computing*, vol. 5, (2), pp. 221–233, April 2017
9. J. Mahal, A. Khawar, A. Abdelhadi, T. Clancy, "Spectral Coexistence of MIMO Radar and MIMO Cellular System," *IEEE Transactions on Aerospace and Electronic Systems*, vol. 53, (2), pp. 655–668, April 2017
10. M. Lichtman, T. Clancy, J. Reed, "FSK-Based Reactive Jamming Piggybacking," *IEEE Communication Letters*, vol. 21, (1), pp. 68–71, January 2017
11. J. Mahal, T. Clancy, "The BER Analysis of OFDMA and SC-FDMA under Pilot-Assisted Channel Estimation and Pilot Jamming in Rayleigh Slow-Fading Channels," *Wiley Wireless Communications and Mobile Computing*, vol. 16, (15), pp. 2315–2328, October 2016
12. C. Shahriar, T. Clancy, R. McGwier, "Equalization Attacks against OFDM: Analysis and Countermeasures," *Wiley Wireless Communications and Mobile Computing*, vol. 16, (13), pp. 1809–1825, September 2016
13. M. Ghorbanzadeh, E. Visotsky, W. Yang, P. Moorut, T. Clancy, "Radar Interference into LTE Base Stations in the 3.5 GHz Band," *Elsevier Physical Communications*, vol. 20, pp. 33–47, September 2016
14. R. Tandon, S. Amuru, T. Clancy, R. Buehrer, "Towards Optimal Secure Distributed Storage Systems with Exact Repair," *IEEE Transactions on Information Theory*, vol. 62, (6), pp. 3477–3492, June 2016
15. A. Khawar, A. Abdelhadi, T. Clancy, "Coexistence Analysis between Radar and Cellular System in LoS Channel," *IEEE Antennas and Wireless Propagation Letters*, vol. 15, pp. 972–975, March 2016
16. M. La Pan, T. Clancy, R. McGwier, "Physical Layer OFDM Acquisition and Timing Synchronization Security," *Wiley Wireless Communications and Mobile Computing*, vol. 16, (2), pp. 177–191, February 2016
17. H. Shajaiah, A. Abdelhadi, T. Clancy, "Towards an Application-Aware Resource Scheduling with Carrier Aggregation in Cellular Systems," *IEEE Communication Letters*, vol. 20, (1), pp. 129–132, January 2016
18. M. Lichtman, J. Poston, S. Amuru, C. Shahriar, T. Clancy, R. Buehrer, J. Reed, "A Communications Jamming Taxonomy," *IEEE Security and Privacy*, vol. 14, (1), pp. 47–54, January 2016
19. H. Shajaiah, A. Abdelhadi, T. Clancy, "An Efficient Multi-Carrier Resource Allocation with User Discrimination Framework for 5G Wireless Systems," *Springer International Journal of Wireless Information Networks*, vol. 22, (4), pp. 345–356, December 2015
20. A. Abdelhadi, A. Khawar, T. Clancy, "Optimal Downlink Power Allocation in Cellular Networks," *Elsevier Physical Communication*, vol. 17, pp. 1–14, December 2015
21. A. Khawar, A. Abdelhadi, T. Clancy, "QPSK Waveform for MIMO Radar with Spectrum Sharing Constraints," *Elsevier Physical Communication*, vol. 17, pp. 37–57, December 2015
22. J. Narayan, S. Shukla, T. Clancy, "A Survey of Automatic Protocol Reverse Engineering Tools," *ACM Computing Surveys*, vol. 48, (3), December 2015

23. A. Kumar, A. Sengupta, R. Tandon, T. Clancy, "Dynamic Resource Allocation for Cooperative Spectrum Sharing in LTE Networks," *IEEE Transactions on Vehicular Technology*, vol. 64, (11), pp. 5232–5245, November 2015
24. A. Khawar, A. Abdelhadi, T. Clancy, "Target Detection Performance of Spectrum Sharing MIMO Radars," *IEEE Sensors Journal*, vol. 15, (9), pp. 4928–4940, September 2015
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26. C. Shahriar, M. La Pan, M. Lichtman, T. Clancy, R. McGwier, R. Tandon, S. Sodagari, J. Reed, "PHY-Layer Resiliency in OFDM Communications: A Tutorial," *IEEE Communications Surveys & Tutorials*, vol. 17, (1), pp. 292–314, March 2015
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28. A. Sengupta, R. Tandon, T. Clancy, "Fundamental Limits on Caching with Secure Delivery," *IEEE Transactions on Information Forensics and Security*, vol. 10, (2), February 2015
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31. J. Park, J. Reed, A. Beex, T. Clancy, V. Kumar, B. Bahrak, "Security and Enforcement in Spectrum Sharing," *Proceedings of the IEEE*, vol. 102, (3), pp. 270–281, March 2014
32. G. Zaki, W. Plishker, S. Bhattacharyya, T. Clancy, J. Kuykendall, "Integration of Dataflow-based Heterogeneous Multiprocessor Scheduling Techniques in GNU Radio," *Journal of Signal Processing Systems*, Springer, vol. 70, (2), pp. 177–191, February 2013
33. J. Goodman, K. Rudd, T. Clancy, "Blind Multiuser Localization in Cognitive Radio Networks," *IEEE Communications Letters*, vol. 16, (7), pp. 1018–1021, July 2012
34. Y. Wu, B. Wang, R. Liu, T. Clancy, "Anti-Jamming Games in Multi-Channel Cognitive Radio Networks," *IEEE Journal on Selected Areas in Communications*, vol. 30, (1), pp. 4–15, January 2012
35. N. Goergen, W. Lin, R. Liu, T. Clancy, "Extrinsic Channel-Like Fingerprint Embedding for Authenticating MIMO Systems," *IEEE Transactions on Wireless Communications*, vol. 10, (12), pp. 4270–4281, December 2011
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42. T. Clancy, "On the Use of Interference Temperature for Dynamic Spectrum Access," *Annals of Telecommunications*, Springer, vol. 64, (7), pp. 573–585, August 2009
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46. T. Clancy, "Secure Handover in Enterprise WLANs: CAPWAP, HOKEY, and 802.11r," *IEEE Wireless Communications*, vol. 15, (5), pp. 80–85, October 2008
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48. T. Clancy, J. Hecker, T. O'Shea, E. Stuntebeck, "Applications of Machine Learning to Cognitive Radio Networks," *IEEE Wireless Communications*, vol. 14, (4), pp. 47–52, August 2007
49. A. Mishra, M. Shin, N. Petroni, T. Clancy, W. Arbaugh, "Proactive Key Distribution using Neighbor Graphs," *IEEE Wireless Communications*, vol. 11, (1), pp. 26–36, February 2004

Conference Papers

Published or Accepted for Publication

1. M. Fowler, P. Tokekar, T. Clancy, R. Williams, "Constrained-Action POMDPs for Multi-Agent Intelligent Knowledge Distribution," *IEEE International Conference on Robotics and Automation*, May 2018
2. T. Erpek, T. O'Shea, T. Clancy, "Learning a Physical Layer Scheme for the Multi-Antenna Interference Channel," *IEEE International Conference on Communications (ICC)*, May 2018
3. H. Shajaiah, A. Abdelhadi, T. Clancy, "Secure Power Scheduling Auction for Smart Grids Using Homomorphic Encryption," *IEEE International Conference on Big Data (BigData)*, December 2017
4. T. O'Shea, T. Erpek, T. Clancy, "Physical Layer Deep Learning of Encodings for the MIMO Fading Channel," *Allerton Conference on Communication, Control, and Computing*, October 2017

5. J. Mitola, M. Vondal, K. Karra, J. Graham, T. Clancy, "Closed-Loop Cognitive Electronic Warfare Operations with Cyber Feedback," IEEE Military Communications Conference (MILCOM), October 2017
6. T. O'Shea, T. Roy, T. Clancy, "Learning Robust General Radio Signal Detection using Computer Vision Methods," IEEE Conference on Signals, Systems and Computers (Asilomar), October 2017
7. T. O'Shea, K. Karra, T. Clancy, "Learning Approximate Neural Estimators for Wireless Channel State Estimation," IEEE International Workshop on Machine Learning for Signal Processing (MLSP), September 2017
8. K. Ryland, T. Clancy, M. Lichtman, "Implementation of Two Physical Layer Security Techniques in OTA Systems," GNU Radio Conference, September 2017
9. T. O'Shea, K. Karra, T. Clancy, "Learning to Communicate: Channel Auto-encoders, Domain Specific Regularizers, and Attention," IEEE International Symposium on Signal Processing and Information Technology (ISSPIT), December 2016
10. A. Kumar, A. Abdelhadi, T. Clancy, "A Delay Efficient MAC and Packet Scheduler for Heterogeneous M2M Uplink," IEEE Global Communications Conference (GLOBECOM), December 2016
11. A. Sengupta, R. Tandon, T. Clancy, "Layered Caching for Heterogeneous Storage," IEEE Conference on Signals, Systems and Computers (Asilomar), November 2016
12. T. O'Shea, L. Pemula, D. Bhatra, T. Clancy, "Radio Transformer Networks: Attention Models for Learning to Synchronize in Wireless Systems," IEEE Conference on Signals, Systems and Computers (Asilomar), November 2016
13. H. Shajaiah, J. Mahal, T. Clancy, "Resource Management with Anti-Jamming Capability for Cognitive Space Communication Systems," IEEE Military Communications Conference (MILCOM), November 2016
14. J. Narayan, T. Clancy, "A Hidden Markov Model Approach for Automatic Closed Protocol Hop Synchronization," IEEE Military Communications Conference (MILCOM), November 2016
15. A. Kumar, A. Abdelhadi, T. Clancy, "A Delay Efficient Multiclass Packet Scheduler for Heterogeneous M2M Uplink," IEEE Military Communications Conference (MILCOM), November 2016
16. A. Kumar, A. Abdelhadi, T. Clancy, "A Delay-Optimal Packet Scheduler for M2M Uplink," IEEE Military Communications Conference (MILCOM), November 2016
17. M. Lichtman, J. Reed, T. Clancy, "Reactive Jammer Piggybacking: Achieving Antifragile Electronic Warfare," IEEE Military Communications Conference (MILCOM), November 2016
18. S. Hitefield, T. Clancy, "Flowgraph Acceleration with GPUs: Analyzing the Benefits of Custom Buffers in GNU Radio," Proceedings of the GNU Radio Conference (GRcon), September 2016
19. T. O'Shea, J. Corgan, T. Clancy, "Convolutional Radio Modulation Recognition Networks," International Conference on Engineering Applications of Neural Networks, September 2016
20. T. O'Shea, J. Corgan, T. Clancy, "Unsupervised Representation Learning of Structured Radio Communication Signals," IEEE International Workshop on Sensing Processing and Learning for Intelligent Machines (SPLINE), July 2016
21. T. Erpek, A. Abdelhadi, T. Clancy, "An Application-Aware Resource Block and Power Allocation for LTE," IEEE Systems Conference, April 2016

22. A. Kumar, A. Abdelhadi, T. Clancy, "An Online Delay Efficient Packet Scheduler for M2M Traffic in Industrial Automation," IEEE Systems Conference, April 2016
23. Y. Wang, A. Abdelhadi, T. Clancy, "Optimal Power Allocation for LTE Users with Different Modulations," IEEE Systems Conference, April 2016
24. H. Shajaiah, A. Abdelhadi, T. Clancy, "An Application-Aware Spectrum Sharing Approach for Commercial Use of 3.5 GHz Spectrum," IEEE Systems Conference, April 2016
25. A. Abdelhadi, F. Rechia, A. Narayanan, T. Teixeira, R. Lent, D. Benhaddou, H. Lee, T. Clancy, "Position Estimation of Robotic Mobile Nodes in Wireless Testbed using GENI," IEEE Systems Conference, April 2016
26. A. Abdelhadi, T. Clancy, "Network MIMO with Partial Cooperation between Radar and Cellular Systems," IEEE International Conference on Computing, Networking and Communications (ICNC), February 2016
27. A. Abdelhadi, T. Clancy, "Optimal Context-Aware Resource Allocation in Cellular Networks," IEEE International Conference on Computing, Networking and Communications (ICNC), February 2016
28. A. Abdelhadi, T. Clancy, "An Optimal Resource Allocation with Frequency Reuse in Cellular Networks," IEEE International Conference on Computing, Networking and Communications (ICNC), February 2016
29. A. Abed, T. Clancy, D. Levy, "Applying Bag of System Calls for Anomaly Detection in Linux Containers," IEEE Global Communications Conference (GLOBECOM), December 2015
30. M. Bari, A. Khawar, M. Doroslovacki, T. Clancy, "Recognizing FM, BPSK and 16-QAM using Supervised and Unsupervised Learning Techniques," IEEE Conference on Signals, Systems and Computers (Asilomar), November 2015
31. J. Mahal, C. Shahriar, T. Clancy, "Jamming and Nulling Attacks on Cyclic Prefix of SC-FDMA and Two Novel Countermeasures," IEEE Military Communications Conference (MILCOM), October 2015
32. M. Fowler, A. O'Donnell, D. DePoy, T. Clancy, "A Cognitive Subsystem for the Optimization of Radar Doctrine for Radar/Comms Coexistence," IEEE Military Communications Conference (MILCOM), October 2015
33. A. Abed, T. Clancy, D. Levy, "Intrusion Detection System for Applications using Linux Containers," International Workshop on Security and Trust Management, Lecture Notes in Computer Science, vol. 9331, pp. 123–135, September 2015
34. A. Sengupta, R. Tandon, T. Clancy, "Improved Approximation of Storage-Rate Trade-off for Caching via New Outer Bounds," IEEE International Symposium on Information Theory (ISIT), June 2015
35. H. Shajaiah, A. Abdelhadi, T. Clancy, "Spectrum Sharing Approach between Radar and Communication Systems and its Impact on Radar's Detectable Target Parameters," IEEE Vehicular Technology Conference (VTC), May 2015
36. W. Sehery, T. Clancy, "Load Balancing in Data Center Networks with Folded-Clos Architectures," IEEE NetSoft Workshop on Management Issues in SDN and NFV, April 2015
37. H. Shajaiah, A. Abdelhadi, T. Clancy, "A Price Selective Centralized Algorithm for Resource Allocation with Carrier Aggregation in LTE Cellular Networks," IEEE Wireless Communications and Networking Conference (WCNC), March 2015
38. C. Shahriar, A. Abdelhadi, T. Clancy, "Overlapped-MIMO Radar Waveform Design for Coexistence with Communication Systems," IEEE Wireless Communications and Networking Conference (WCNC), March 2015

39. M. Ghorbanzadeh, E. Visotsky, P. Moorut, W. Yang, T. Clancy, "Radar In-band and Out-of-Band Interference into LTE Macro and Small Cell Uplinks in the 3.5 GHz Band," IEEE Wireless Communications and Networking Conference (WCNC), March 2015
40. M. Ghorbanzadeh, A. Abdelhadi, T. Clancy, "A Utility Proportional Fairness Radio Resource Block Allocation in Cellular Networks," IEEE International Conference on Computing, Networking and Communications (ICNC), February 2015
41. A. Abdelhadi, T. Clancy, "An Optimal Resource Allocation with Joint Carrier Aggregation in 4G-LTE," IEEE International Conference on Computing, Networking and Communications (ICNC), February 2015
42. M. Ghorbanzadeh, E. Visotsky, P. Moorut, W. Yang, T. Clancy, "Radar in-Band Interference Effects on Macrocell LTE Uplink Deployments in the U.S. 3.5 GHz Band," IEEE International Conference on Computing, Networking and Communications (ICNC), February 2015
43. M. Ghorbanzadeh, A. Abdelhadi, A. Amanna, J. Dwyer, T. Clancy, "Implementing an Optimal Rate Allocation Tuned to the User Quality of Experience," IEEE International Conference on Computing, Networking and Communications (ICNC), February 2015
44. A. Kumar, R. Tandon, T. Clancy, "On the Latency of Heterogeneous MDS Queue," IEEE Global Communications Conference (GLOBECOM), December 2014
45. M. La Pan, T. Clancy, R. McGwier, "A Machine Learning Approach for Dynamic Spectrum Access Radio Identification," IEEE Global Communications Conference (GLOBECOM), December 2014
46. J. Tate, T. Clancy, "Secure and Tamper Proof Code Management," ACM CCS Workshop on Cyber Security Analytics and Automation (SafeConfig), November 2014
47. M. Ghorbanzadeh, A. Abdelhadi, T. Clancy, "A Utility Proportional Fairness Resource Allocation in Spectrally Radar-Coexistent Cellular Networks," IEEE Military Communications Conference (MILCOM), October 2014
48. C. Shahriar, C. Cole, T. Clancy, "Performance Impact of Imperfect CSI on Spatial Hiding Anti-Jam Communications," IEEE Military Communications Conference (MILCOM), October 2014
49. C. Cole, C. Shahriar, T. Clancy, "An Anti-jam Communications Technique via Spatial Hiding Precoding," IEEE Military Communications Conference (MILCOM), October 2014
50. A. Khawar, A. Abdelhadi, T. Clancy, "On The Impact of Time-Varying Interference-Channel on the Spatial Approach of Spectrum Sharing between S-band Radar and Communication System," IEEE Military Communications Conference (MILCOM), October 2014
51. M. La Pan, T. Clancy, R. McGwier, "An Assessment of OFDM Carrier Frequency Offset Synchronization Security for 4G Systems," IEEE Military Communications Conference (MILCOM), October 2014
52. M. Lichtman, J. Peck, V. Arellano, J. Reed, T. Clancy, "An Electronic Warfare Perspective of LTE," IEEE Military Communications Conference (MILCOM), October 2014
53. S. Hitefield, M. Fowler, C. Jennette, T. Clancy, "Link Hijacking through Wireless Exploitation of a Vulnerable Software Defined Waveform," IEEE Military Communications Conference (MILCOM), October 2014
54. H. Shajaiah, A. Abdelhadi, T. Clancy, "Multi-Application Resource Allocation with Users Discrimination in Cellular Networks," IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC), September 2014

55. A. Sengupta, R. Tandon, T. Clancy, "Decentralized Caching with Secure Delivery," IEEE International Symposium on Information Theory (ISIT), July 2014
56. A. Sengupta, R. Tandon, T. Clancy, "Fundamental Limits of Caching with Secure Delivery," IEEE ICC Workshop on Wireless Physical Layer Security, June 2014
57. J. Mahal, T. Clancy, "The Closed-form BER Expressions of PSK Modulation for OFDM and SC-FDMA under Jamming and Imperfect Channel Estimation," IEEE International Conference on Communications (ICC), June 2014
58. R. Tandon, S. Amuru, T. Clancy, R. Buehrer, "Optimal Secure (3; 2; 2) and (4; 3; 3) Distributed Storage Systems with Exact Repair," IEEE International Conference on Communications (ICC), June 2014
59. Y. Chen, M. Ghorbanzadeh, K. Ma, T. Clancy, R. McGwier, "A Hidden Markov Model Detection of Malicious Android Applications at Runtime," IEEE Wireless & Optical Communications Conference (WOCC), May 2014
60. A. Sengupta, R. Tandon, T. Clancy, "Secure Caching with Non-Uniform Demands," IEEE Global Wireless Summit (GWS), May 2014
61. A. Khawar, A. Abdelhadi, T. Clancy, "A Mathematical Analysis of Cellular Interference on the Performance of S-band Military Radar Systems," IEEE Wireless Telecommunications Symposium (WTS), April 2014
62. A. Khawar, A. Abdelhadi, T. Clancy, "Spectrum Sharing between S-band Radar and LTE Cellular System: A Spatial Approach," IEEE DySPAN Workshop on Shared Spectrum Access for Radar and Communications (SSPARC) Technologies, April 2014
63. A. Khawar, A. Abdelhadi, T. Clancy, "MIMO Radar Waveform Design for Coexistence with Cellular Systems," IEEE DySPAN Workshop on Shared Spectrum Access for Radar and Communications (SSPARC) Technologies, April 2014
64. H. Shajaiah, A. Khawar, A. Abdelhadi, T. Clancy, "Resource Allocation with Carrier Aggregation in LTE Advanced Cellular System Sharing Spectrum with S-band Radar," IEEE DySPAN Workshop on Shared Spectrum Access for Radar and Communications (SSPARC) Technologies, April 2014
65. A. Abdelhadi, T. Clancy, "A Utility Proportional Fairness Approach for Resource Allocation in 4G-LTE," IEEE International Conference on Computing, Networking, and Communications (ICNC), February 2014
66. V. Kumar, J. Park, T. Clancy, K. Bian, "PHY-Layer Authentication Using Hierarchical Modulation and Duobinary Signaling," IEEE International Conference on Computing, Networking, and Communications (ICNC), February 2014
67. H. Shajaiah, A. Abdelhadi, T. Clancy, "Spectrum Sharing between Public Safety and Commercial Users in 4G-LTE," IEEE International Conference on Computing, Networking, and Communications (ICNC), February 2014
68. A. Khawar, A. Abdelhadi, T. Clancy, "Beampattern Analysis for MIMO Radar and Telecommunication System Coexistence," IEEE International Conference on Computing, Networking, and Communications (ICNC), February 2014
69. S. Amuru, R. Tandon, R. Buehrer, T. Clancy, "Jamming Countermeasures for Multi-User MISO Broadcast Channels: A DoF Perspective," IEEE Global Communications Conference (GLOBECOM), December 2013
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71. S. Amuru, R. Tandon, R. Buehrer, T. Clancy, "Interference Alignment for MISO Broadcast Channels under Jamming attacks," IEEE Conference on Signals, Systems, and Computers (Asilomar), November 2013

72. A. Abdelhadi, T. Clancy, "A Resource Allocation Algorithm for Multi-Application Users in 4G-LTE," ACM MOBICOM Workshop on Cognitive Radio Architectures for Broadband (CRAB), October 2013
73. V. Kumar, J. Park, T. Clancy, K. Bian, "PHY-Layer Authentication by Introducing Controlled Inter Symbol Interference," IEEE Conference on Communications and Network Security (CNS), October 2013
74. A. Abdelhadi, T. Clancy, "A Robust Optimal Rate Allocation Algorithm and Pricing Policy for Hybrid Traffic in 4G-LTE," IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC), September 2013
75. M. Ghorbanzadeh, Y. Chen, T. Clancy, R. McGwier, "Fine-Grained End-to-End Network Model via Vector Quantization and Hidden Markov Processes," IEEE International Conference on Communications (ICC), June 2013
76. C. Shahriar, S. Sodagari, R. McGwier, T. Clancy, "Performance Impact of Asynchronous Off-tone Jamming Attacks Against OFDM," IEEE International Conference on Communications (ICC), June 2013
77. M. La Pan, T. Clancy, R. McGwier, "Phase Warping and Differential Scrambling Attacks against OFDM Frequency Synchronization," IEEE International Conference on Acoustics Speed and Signal Processing (ICASSP), May 2013
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79. M. Ghorbanzadeh, Y. Chen, K. Ma, T. Clancy, R. McGwier, "A Neural Network Approach to Category Validation of Android Applications," IEEE International Conference on Computing, Networking and Communications (ICNC), January 2013
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87. S. Sodagari, T. Clancy, "An Anti-Jamming Strategy for Channel Access in Cognitive Radio Networks," Conference on Decision and Game Theory for Security (GameSec), November 2011
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97. A. Khawar, T. Clancy, "Signal Classifiers using Self-Organizing Maps: Performance and Robustness," SDR Forum Technical Conference (SDR), November 2009
98. T. Clancy, A. Burnette, A. Agrawala, "MAXWell Lab: Building a WiMAX Forum Applications Laboratory," IEEE Mobile WiMAX Symposium, July 2009
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114. T. OShea, T. Clancy, H. Ebeid, "Practical Signal Detection and Classification in GNU Radio," SDR Forum Technical Conference (SDR), November 2007
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119. T. Clancy, "Achievable Capacity under the Interference Temperature Model," IEEE Conference on Computer Communications (INFOCOM), pp. 794–802, May 2007
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2. S. Hitefield, V. Nguyen, C. Carlson, T. OShea, T. Clancy, "Demonstrated LLC-Layer Attack and Defense Strategies for Wireless Communication Systems," IEEE CNS Workshop on Cognitive Radio and Electromagnetic Spectrum Security (CRESS), October 2014
3. A. Sengupta, S. Amuru, R. Tandon, R. Buehrer, T. Clancy, "Learning Distributed Caching Strategies in Small Cell Networks," IEEE International Symposium on Wireless Communication Systems (ISWCS), August 2014
4. R. Tandon, S. Amuru, T. Clancy, R. Buehrer, "Distributed Storage Systems with Secure and Exact Repair - New Results," IEEE Information Theory and Applications (ITA), February 2014
5. M. Lichtman, J. Reed, M. Norton, T. Clancy, "Vulnerability of LTE to Hostile Interference," IEEE Global Conference on Signal and Information Processing (GlobalSIP), November 2013
6. T. Clancy, M. Norton, M. Lichtman, "Security Challenges with LTE-Advanced Systems and Military Spectrum," IEEE Military Communications Conference (MILCOM), November 2013
7. M. La Pan, M. Lichtman, T. Clancy, R. McGwier, "Protecting Physical Layer Synchronization: Mitigating Attacks against OFDM Acquisition," IEEE Global Wireless Summit (GWS), June 2013
8. T. Clancy, "Confluence of Electronic Warfare and Computer Network Attack," Emerging Technologies Conference, Lawrence Livermore National Labs, November 2011
9. C. Shahriar, S. Sodagari, T. Clancy, "Physical-Layer Security Challenges of DSA-Enabled TD-LTE," Conference on Cognitive Radio and Advanced Spectrum Management (CogArt), October 2011
10. S. Sodagari, T. Clancy, "Preemption, Fairness, and Security Dynamics in Heterogeneous DSA Environments," IEEE International Symposium on Personal, Indoor, and Mobile Radio Communications (PIMRC), September 2011
11. G. Zaki, W. Plishker, S. Bhattacharyya, E. Blossom, T. OShea, N. McCarthy, T. Clancy, "Integration of Dataflow Optimization Techniques into a Software Radio Design Framework," IEEE Conference on Signals, Systems, and Computers (Asilomar), November 2009
12. T. Clancy, M. Beecher, I. Vo, B. Walker, "A Demonstration of the MeshTest Wireless Testbed," IEEE Conference on Testbeds and Research Infrastructure (TridentCom), April 2009

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2. T. Clancy, H. Tschofenig, "EAP Generalized PSK (GPSK)," RFC 5433, Proposed Standard, February 2009
3. S. Kelly, T. Clancy, "CAPWAP Threat Analysis for 802.11 Deployments," RFC 5418, Informational, December 2008
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5. T. Clancy, M. Nakhjiri, V. Narayanan, L. Dondeti, "Handover Key Management and Re-Authentication Problem Statement," RFC 5169, Informational, March 2008
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Intellectual Property

Awarded Patents

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2. C. White, B. Dougherty, D. Hamrick, G. Sharpe, R. Hanlin, K. Zienkiewicz, C. Thompson, T. Clancy, "Systems and Methods for Enforcing Security in Mobile Computing," (US 9,773,107 awarded September 2017), filed January 2013
3. C. White, T. Clancy, B. Dougherty, "Systems and Methods for Enforcing Security in Mobile Computing," (US 9,712,530 awarded July 2017), filed January 2012

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7. A. Amanna, J. Mitola, R. Tandon, T. Clancy, J. Reed, R. McGwier, A. Sengupta, A. Kumar, "System and Method for Heterogeneous Spectrum Sharing Between Commercial Cellular Operators and Legacy Incumbent Users in Wireless Networks," (US 9,516,508 awarded December 2016), filed March 2013
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2. K. Karra, T. O'Shea, T. Clancy, "Learning Approximate Neural Estimators for Wireless Channel State Information," (US provisional filing 62/523,861), filed June 2017
3. A. Abdelhadi, T. Clancy, R. McGwier, J. Mitola, "System and Method for Optimal Resource Allocation Using Joint Carrier Aggregation," (US provisional filing 61/859,536), filed July 2013
4. H. Shajaiah, A. Abdelhadi, T. Clancy, "Utility Proportional Fairness Resource Allocation with Carrier Aggregation in 4G-LTE," (US provisional filing 61/828,624), filed May 2013

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2. "5G Mobile Technologies," The CyberWire, April 28, 2017
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9. "Cybersecurity: 5G Cellular," Pulse of the Planet (NPR Syndicated), December 19, 2016
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3. "CACI Becomes Anchor Partner in Cyber-Physical System Security Program With Virginia Tech Hume Center," Business Wire, February 2016
4. "Allied Minds Announces the Formation of HawkEye 360," Business Wire, September 2015
5. "Optio Labs Names Mobile Industry Veteran Gregg Smith as Chief Executive Officer," Business Wire, December 2014
6. "Federated Wireless Applauds FCC for Adopting Three-Tier Spectrum Sharing Network and Recommends That the Exclusion Zones Be Eliminated to Broaden Access Further," Business Wire, July 2014
7. "Mobile Security Software Developer Optio Labs Raises \$10 Million in Series A Round," Business Wire, March 2014

8. "Optio Labs Appoints Mobile and Cyber Security Industry Veteran Matt Hartley as General Manager to Drive Commercial Expansion," Business Wire, August 2013

Invited Talks

1. "Organizer, Artificial Intelligence and Machine Learning Panel," AFCEA/INSA Intelligence and National Security Summit, Washington, DC, September 2017
2. "Moderator, Leveraging Broader Federal Funding for I/UCRCs," NSF Industry/University Cooperative Research Center Conference, Arlington, VA, July 2017
3. "Panelist, Partnering with Academia: Growing Relationships between the IC and Academia," IC STEM Recruitment Summit, Bethesda, MD, June 2017
4. "Witness, Promoting Security in Wireless Technology," US House of Representatives, Energy and Commerce Committee, Communications and Technology Subcommittee, Washington, DC, June 2017
5. "Moderator, Cyber Threat Sharing," Commonwealth Conference on National Defense and Intelligence, Charlottesville, VA, June 2017
6. "Panelist, Emerging Technology: Internet of Things," LMI Research Institute Government-University Forum, Vienna, VA, May 2017
7. "Panelist, Cybersecurity Challenges and What Congress Can Do About It," Virginia Tech Roundtable on Capitol Hill, Washington, DC, March 2017
8. "Speaker/Panelist, Cybersecurity for Commercial Aviation," United Technologies Research Center, East Hartford, CT, March 2017
9. "Speaker, 5G, IoT, and Edge Computing," Bround Bag Seminar, G2 Inc, Annapolis Junction, MD, February 2017
10. "Panelist, Machine Learning: Research and Applications," IEEE Global Signal and Information Processing (GlobalSIP), Washington, DC, December 2016
11. "Moderator, Force Multipliers to Future Cybersecurity," NVTc Capital Cybersecurity Conference, Vienna, VA, November 2016
12. "Moderator, Commercialization of State of the Art Cyber Research Panel," Virginia Tech Enterprise Forum: The Evolution and Expansion of Cybersecurity, Arlington VA, October 2016
13. "Moderator, IoT as a Game Changer Panel," Virginia Governor's Cyber-Physical Systems Summit, Newport News, VA, September 2016
14. "Keynote, Deep Neural Signal Processing," GNU Radio Annual Conference (GRcon), Boulder, CO, September 2016
15. "Speaker, Challenges and Opportunities with Power Infrastructure Cybersecurity," IEEE Power and Energy Society MD Section, Baltimore, MD, September 2016
16. "Speaker, Challenges and Opportunities with Power Infrastructure Cybersecurity," IEEE Power and Energy Society VA/DC Section, Arlington, VA, June 2016
17. "Moderator, Cyber Careers Panel," Business Higher Education Forum CyberLeaders Kickoff, Arlington, VA, June 2016
18. "Keynote, Cybersecurity for the IoT," ForeScout Best Practice Seminar, Washington, DC, May 2016
19. "Moderator, Harnessing the Next Technological Revolution Panel," AFCEA Intelligence Symposium, Springfield, VA, April 2016

20. "Panelist, Academic Panel," Northrop Grumman Executive Symposium, Falls Church, VA, March 2016
21. "Speaker, Electronic Warfare in Modern Military Operations," Information Warfare Guest Lecture, Georgetown University, Washington, DC, February 2016
22. "Panelist, Assured Communications," IEEE Military Communications Conference, Tampa, FL, October 2015
23. "Speaker, Cybersecurity Risks to Connected Vehicles and Smart Infrastructure," ITS America Webinar, October 2015
24. "Speaker, Cognition and Autonomy in Electronic Warfare Platforms," Electromagnetic Spectrum Operations Summit, Alexandria, VA, May 2015
25. "Speaker, Cognitive Electronic Warfare: An Information Theory and Machine Learning Perspective," Association of Old Crows Luncheon, Arlington, VA, March 2015
26. "Speaker, Information Security and Privacy in the Mobile World," Virginia Tech Presidential Installation Academic Showcase, Blacksburg, VA, October 2014
27. "Speaker, Applications of Cognition to MIMO Radar for Spectrum Sharing," Cognitive RF Workshop, Army Research Labs, Adelphi, MD, June 2014
28. "Speaker, Risk-Based Cybersecurity Regulation and the NIST Framework," CIO Summit, Richmond, VA, June 2014
29. "Speaker, Broadband Access and the Digital Divide," Virginia Wireless Association Seminar, Alexandria, VA, May 2014
30. "Speaker, Future Directions in Cyber Warfare and Electronic Warfare," Naval Postgraduate School Foundation Roundtable, Washington, DC, April 2014
31. "Speaker, Future Directions in Cyber Warfare and Electronic Warfare," Virginia Military Institute Seminar, Lexington, VA, April 2014
32. "Speaker, Convergence of Electronic Warfare and Cyber Warfare: First Principals," Cyber/EW CAG, L-3 Communications, Arlington, VA, March 2014
33. "Speaker, The Science of Electronic Warfare: Bounds on Target Knowledge," Sensors Directorate Seminar, Air Force Research Labs, Dayton, OH, February 2014
34. "Speaker, Control Theory and the Dynamics of Cybersecurity," EECS With-It Seminar, Vanderbilt University, Nashville, TN, January 2014
35. "Speaker, Spectrum Sharing to Support Commercial use of Military Spectrum," Classified US Military Communications Conference, McLean, VA, November 2013
36. "Keynote, Broadband Access and the Digital Divide," Exploring Loudoun Countys Digital Divide, Ashburn, VA, November 2013
37. "Speaker, Cybersecurity Research, Education, and Outreach at Virginia Tech," Dulles Chamber Innovate Conference, Dulles, VA, October 2013
38. "Speaker, Security Challenges with LTE-Advanced Systems and Military Spectrum," IEEE Communications Society (COMSOC) Baltimore Section, Linthicum, MD, October 2013
39. "Speaker, Vulnerability Assessment of Emerging Mobile Core Networks," Cellular Telephone Industry Association (CTIA), Cybersecurity Working Group Meeting, Washington, DC, October 2013
40. "Speaker, Security and Management of Android Devices," Google Federal Technology Workshop, Washington, DC, June 2013
41. "Speaker, How Secure is Your Smartphone," Wireless @ Virginia Tech Advisory Board Meeting, Blacksburg, VA, May 2013

42. "Speaker, Cyber-Physical Security: Hacking the Internet of Things," Virginia Tech Black Swan Seminar, Blacksburg, VA, April 2013
43. "Speaker, Secure Mobility: From RF to Apps," Electrical and Computer Engineering Seminar, Virginia Tech, Blacksburg, VA, April 2013
44. "Speaker, Research Directions in Security," Research Day, Virginia Tech Center for Embedded Systems and Critical Applications, Arlington, VA, March 2013
45. "Speaker, Cyber Warfare: Intersection of Technology and Analytics," DIA Five Eyes Analytic Training Workshop, Harrisonburg, VA, February 2013
46. "Speaker, Jamming and Next-Generation Commercial Waveforms," DOD CIO LTE Jamming Technical Exchange Meeting, McLean, VA, February 2013
47. "Speaker, Security and Management of Android Devices," Google Mobile Security Forum, Washington, DC, November 2012
48. "Panelist, Cybersecurity Education," Cyber Innovation Symposium, Intelligence and National Security Alliance (INSA), Washington, DC, September 2012
49. "Panelist, Cyber Education and Research at Virginia Tech," NSA Information Assurance Symposium, Nashville, TN, August 2012
50. "Speaker, Cybersecurity for Mobile Broadband Networks," Cellular Telephone Industry Association (CTIA), Cybersecurity Working Group, Arlington, VA, July 2012
51. "Speaker, Cybersecurity Innovation and Research," Virginia Tech Intelligence and Defense Executive Alumni Event, Arlington, VA, June 2012
52. "Speaker, Wireless and Mobile Security Trends," Center for High Assurance Computer Systems Seminar, Naval Research Laboratory, Washington, DC, June 2012
53. "Speaker, Security and Robustness of TD-LTE for Public Safety Applications," Security and Software Engineering Research Center (S2ERC) Showcase, Arlington, VA, May 2012
54. "Speaker, Cognitive Radar for Spectrum Coexistence," Communications Research Gathering, Office of Naval Research, Washington, DC, May 2012
55. "Speaker, Mobile Security Research and Trends," Northrop Grumman Mobile Community of Interest, McLean, VA, May 2012
56. "Speaker, Cybersecurity Research and Education at Virginia Tech," Cybersecurity Workshop and Panel, Office of Congressman Jim Moran, Arlington, VA, April 2012
57. "Speaker, Electronic Warfare and Cyber Warfare," Association of Old Crows, Naval Research Labs, Washington, DC, April 2012
58. "Speaker, Tactical ISR Challenges with 5G Cellular Communications," US Marine Radio Battalion Users Conference, Monterey, CA, April 2012
59. "Panelist, Cybersecurity Research and Development at Virginia Tech," Northern Virginia Technology Council, Vienna, VA, March 2012
60. "Moderator, Securing the Mobile Frontier," Executive Discussion on Cybersecurity and Mobility, Washington, DC, February 2012
61. "Speaker, Electronic Warfare in a Cyber Battlefield," IDGA Network Enabled Operations Summit, Alexandria, VA, January 2012
62. "Speaker, Making Sense of Intelligence through Visualization," ManTech WoW Technical Conference, Stafford, VA, September 2011
63. "Speaker, Securitys Promising Directions and Biggest Challenges," Security and Software Engineering Research Center Workshop, Ball State University, Muncie, IN, May 2011

64. "Speaker, International Technology and Policy Impact of Cyber Warfare," Virginia Tech Cybersecurity Summit and Competition, Blacksburg, VA, April 2011
65. "Panelist, Cybersecurity Panel," Special Session on National Security: Cybersecurity & Wireless Communications, Howard University, Washington, DC, September 2010
66. "Speaker, An Insider's View of Working for the US Federal Government," Intelligence Community Center of Academic Excellence Seminar, Virginia Tech, Blacksburg, VA, September 2010
67. "Speaker, TRANSEC and COMSEC Recommendations for a Military WiMAX Profile," DoD 802.16 Secure Profile Industry Day, McLean, VA, July 2009
68. "Speaker, Using Game Theory to Analyze Spectral Fairness and Robustness to Adversarial Agents in DSA Networks," DSO Workshop on Dynamic Spectrum Access, Arlington, VA, June 2009
69. "Speaker, Security Threats to Intelligent Networks," Department Seminar, Universidad de Murcia, Spain, May 2009
70. "Speaker, New protocol standards for wireless mobility: CAPWAP and HOKEY," Security for Seamless Mobility Forum, IEEE Globecom 2008, New Orleans, December 2008
71. "Speaker, Game Theory and Dynamic Spectrum Access," Emerging Spectrum Technology Workshop, DISA Defense Spectrum Organization, March 2008
72. "Speaker, Security Threats to Intelligent Wireless Networks," Security and Privacy for 4G Workshop, IEEE Globecom 2007, Washington, DC, November 2007
73. "Panelist, Securing Next-Generation Mobile Networks: How Far Are We?," Security and Privacy for 4G Workshop, IEEE Globecom 2007, Washington, DC, November 2007
74. "Speaker, Challenges in Signal Detection and Identification," SASDCRT Symposium, Naval Postgraduate School, Monterey, CA, September 2007
75. "Speaker, Software-Defined and Cognitive Radio," University of Maryland Telecommunications Seminar, College Park, MD, February 2007
76. "Speaker, Whither WiMAX," Red Blue (ReBl) Symposium, Johns Hopkins Applied Physics Lab, Laurel, MD, October 2006
77. "Speaker, Open-Source Cognitive Radio," SASDCRT Symposium, Naval Postgraduate School, Monterey, CA, September 2006
78. "Speaker, Unlicensed Devices in Licensed Bands," Communications Seminar, University of Illinois Urbana-Champaign, Urbana, IL, May 2006
79. "Speaker, CAPWAP System Security," CAPWAP Working Group, Internet Engineering Task Force, Vancouver, BC, November 2005
80. "Speaker, Interference Temperature Multiple Access," Virginia Tech Wireless Seminar, Blacksburg, VA, November 2005
81. "Speaker, EAP Password Authenticated Exchange," EAP Working Group, Internet Engineering Task Force, San Diego, CA, August 2004
82. "Speaker, Password Authentication in the Wireless World," Rose-Hulman Institute of Technology, Terre Haute, IN, March 2004
83. "Speaker, Provably Secure Middleware for Distributed Application Development," Boeing Phantomworks, Seattle, WA, November 2003
84. "Speaker, FPGA-Based Hyperelliptic Curve Cryptosystems," AMS Central Section Meeting, Indiana University, Bloomington, April 2003
85. "Speaker, On the Feasibility and Security of Biometric Cryptosystems," Rose-Hulman Institute of Technology, Terre Haute, IN, March 2003