Roger A. Hallman

Thayer School of Engineering at Dartmouth College, 14 Engineering Drive
Hanover, New Hampshire 03755

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 http://orcid.org/0000-0002-0971-2077

Education

Thayer School of Engineering, Dartmouth College   **Hanover, New Hampshire**
PhD. in Engineering Science   *Expected Graduation: 2023*

Faculty Supervisor: Professor George Cybenko

Proposed Research Focus: Resilient and Trustworthy, Distributed Computation for Machine Learning in Competitive Environments

School of Mathematical and Statistical Sciences, Arizona State University   **Tempe, Arizona**
BSc. in Mathematics   *2013*

Relevant Experience

Thayer School of Engineering, Dartmouth College   **Hanover, New Hampshire**
Graduate Teaching Assistant   *2019*

o ENGS 27: Discrete and Probabilistic Systems | Fall 2019

Naval Information Warfare Center (NIWC) Pacific   **San Diego, California**
Civilian Computer Research Scientist   *2014–Present*

o Developed decision support algorithms, homomorphic encryption applications, cybersecurity cost/benefit analysis, and malware analysis.
o Contracting Officer's Representative and Technical Agent for the DARPA Brandeis Program from 2015–2018.
o Participated in Source Selection Evaluation Boards for multiple Research & Development programs.
o Principal Investigator (PI) on multiple Cooperative Research and Development Agreements (CRADAs) with domestic and international collaborators.
o PI or Co-PI on multiple S&T efforts, with intellectual property created and results documented in refereed and non-refereed publications.
o Served as Acting Branch Head (first-line supervisor), as needed.
o Mentored college and high school student interns.
o Science Mathematics And Research for Transformation (SMART) Retention Scholar, 2019–2023
o *On Intermittent Employment status with NIWC Pacific while at Dartmouth College.*

Scottsdale Community College   **Scottsdale, Arizona**
Mathematics Tutor   *2008–2014*

o Tutored diverse groups of students in a variety mathematics courses ranging from remedial arithmetic to university-level subjects (e.g., Calculus, Differential Equations, and Linear Alge-

bra).

Adjunct Instructor   *2012–2013*

- Taught Food Costing (a "math for chefs" course) and Garde Manger to diverse groups of students in the Scottsdale Community College Culinary Arts program while completing BSc. in Mathematics at ASU.

United States Marine Corps   **Marine Corps Base Twentynine Palms, California**
Enlisted Marine   *2000–2005 (Active Duty), 2005–2008 (Individual Ready Reserve)*

- Two deployments in support of Operation Iraqi Freedom: Phase 1 (Liberation of Iraq), and Phase 3 (Iraqi Governance).
- **Sergeant of the Guard** at 'Camp Korean Village', Al Anbar Province, Iraq: responsible for leading a squad of 12 Marines and overseeing physical installation security.
- **Chief Cook** (equivalent to Sous Chef/first-line supervisor): responsible for supervising 3–7 subordinates and ensured timely preparation of meals for up to 1,000 Marines, both in garrison and in theater.
- Separated from active service with the rank of Corporal in 2005 and was promoted to Sergeant while a member of the Individual Ready Reserve until receiving an Honorable Discharge in 2008.
- **Military Awards:** Combat Action Ribbon, Presidential Unit Citation, Naval Unit Commendation, Good Conduct Medal, National Defense Medal, Iraq Campaign Medal (with two bronze star devices), Global War on Terror Expeditionary Medal, Global War on Terror Service Medal, Sea Service Deployment Ribbon (with one bronze star device), two Letters of Appreciation

Intellectual Property

Patents Issued:

- Diallo, M.H., Hallman, R., August, M., Kline, M., Au, H., "System and Method for Automating Indirect Fire Protocol Using Fully Homomorphic Encryption", US Patent No.: 10,439,799, October 8, 2019 | US Navy Case No.: 104,345
- Diallo, M.H., August, M., Kline, M., Slayback, S.M., Hallman, R., "System and Method for Automatically Triggering the Live Migration of Cloud Services and Automatically performing the Triggered Migration", US Patent No.: 10,375,169, August 6, 2019 | US Navy Case No.: 104,117

Patent Applications:

- San Miguel, S., Kline, M., Hallman, H., Romero-Mariona, J., Phan, J., Slayback, S.M., Weeden, C., "System and Method for Aggregated Machine Learning on Indicators of Compromise on Mobile Devices", filed October 8, 2019 | US Navy Case No.: 108,745; US Patent Application No.: 16/596,575
- August, M., Diallo, M.H., Glasser, D., Graves, C., Hallman, R., Slayback, S.M., "Anomaly Detection for the Purpose of Preserving Availability of Virtualized Cloud Services", filed August 21, 2018 | US Navy Case No.: 107,938; US Patent Application No.: 16/106,740
- Romero-Mariona, R., San Miguel, J., Kline, M., Parikh, K., Hallman, R., "Real Time Interface

System and Method for Information Assurance Technologies", filed March 7, 2018 | US Navy Case No.: 103,514; US Patent Application No.: 15/914,148; Publication No.: US 2019/0278861 A1

Publications

ORCID ID: 0000-0002-0971-2077

Google Scholar: https://scholar.google.com/citations?user=hJ7oOFsAAAAJ&hl=en

ResearchGate: https://www.researchgate.net/profile/Roger_Hallman2

Journal Articles

2017:

- Diallo, M.H., August, M., Hallman, R., Kline, M., Slayback, S.M., Graves, C., "AutoMigrate: A Framework for Developing Intelligent, Self-Managing Cloud Services with Maximum Availability", in *Cluster Computing*, Volume 20, Issue 3, pp. 1995–2012, Springer (DOI: 10.1007/s10586-017-0900-x) | *Citation count: 8*

Conference & Workshop Papers

2018:

- Hallman, R., Li, S., Chang, V., "2nd International Workshop on Multimedia Privacy and Security: Co-Located Workshop: Chairs' Summary Abstract", in *Proceedings of the 2018 ACM SIGSAC Conference on Computer and Communications Security (CCS 2018)*, Toronto, Ontario, Canada, October 2018 (DOI: 10.1145/3243734.3243876)

- Hallman, R., Diallo, M.H., August, M., Graves, C., "Homomorphic Encryption for Secure Computation on Big Data", in *Recent Advances on Security, Privacy, Big Data and Internet of Things, 3rd International Conference on Internet of Things, Big Data and Security (IoTBDS 2018)*, Funchal, Madeira, Portugal, March 2018 (DOI: 10.5220/0006823203400347) | *Citation count: 3*

2017:

- Hallman, R., Rohloff, K., Chang, V., "Workshop on Multimedia Privacy and Security: Co-Located Workshops Chairs Summary Abstract", in *Proceedings of the 2017 ACM SIGSAC Conference on Computer and Communications Security (CCS 2017)*, Dallas, Texas, USA, October 2017 (DOI: 10.1145/3133956.3137043)

- DiVita, J., Hallman, R., "An Approach to Botnet Malware Detection Using Nonparametric Bayesian Methods", in *2nd International Workshop on Malware Analysis, International Conference on Availability, Reliability and Security (ARES 2017)*, Reggio Calabria, Italy, August 2017 (DOI: 10.1145/3098954.3107010) | *Slides available at:* https://www.researchgate.net/publication/3194-1692_ARES_NPBM_Presentation_v6 | *Citation count: 1*

- Hallman, R., Bryan, J., Palavicini, G., Divita, J., Romero-Mariona, J., "IoDDoS — The Internet of Distributed Denial of Service Attacks: A case study of the Mirai Malware and IoT-based botnets", in *2nd International Conference on Internet of Things, Big Data and Security (IoTBDS 2017)*, Porto, Portugal, April 2017 (DOI: 10.5220/0006246600470058) | *Slides available at:* https://www.researchgate.net/publication/316455483_IoDDoS_Slides_FINAL | *Citation count: 23*

2016:

- Diallo, M.H., August, M., <u>Hallman, R.</u>, Kline, M. and Slayback, S.M., "AutoMigrate: A Framework for Developing Intelligent, Self-Managing Cloud Services with Maximum Availability", in *2016 IEEE International Conference on Cloud and Autonomic Computing (ICCAC 2016)*, Augsburg, Germany, September 2016 (DOI: 10.1109/ICCAC.2016.19) | *Citation count: 2* | **SSC Pacific Publication Award**

- Romero-Mariona, J., <u>Hallman, R.</u>, Kline, M., San Miguel, J., Major, M. and Kerr, L., "Security in the Industrial Internet of Things - The C-SEC Approach", in *International Conference on Internet of Things and Big Data (IoTBD 2016)*, Rome, Italy, April 2016 (DOI: 10.5220/0005877904210428) | *Citation count: 15*

- Kerr, L., Romero-Mariona, J., <u>Hallman, R.</u>, Coronado, B., Bryan, J., Palavicini, G., Kline, M., Major, M., San Miguel, J., "TMT: Technology Matching Tool for SCADA Network Security", in *Cybersecurity Symposium*, Coeur d'Alene, Idaho , USA, April 2016 (DOI: 10.1109/CYBERSEC.2016.014) | *Citation count: 1*

- Diallo, M.H., August, M., <u>Hallman, R.</u>, Kline, M., Au, H. and Beach, V., "CallForFire: A Mission-Critical Cloud-Based Application Built Using the Nomad Framework", in *4th Workshop on Encrypted Computing and Applied Homomorphic Cryptography, International Conference on Financial Cryptography and Data Security (FC 2016)*, Christ Church, Barbados, February 2016 (DOI: 10.1007/978-3-662-53357-4_21) | *Citation count: 5*

2015:

- Diallo, M.H., August, M., <u>Hallman, R.</u>, Kline, M., Au, H. and Beach, V., "Nomad: A Framework for Developing Mission-Critical Cloud-Based Applications", in *Workshop on Security and Privacy in Cloud-based Applications, International Conference on Availability, Reliability and Security (ARES 2015)*, Toulouse, France, August 2015 (DOI: 10.1109/ARES.2015.94) | *Citation count: 6*

Book Chapters..

2017:

- Diallo, M.H., August, M., <u>Hallman, R.</u>, Kline, M., Au, H., Slayback, S., "Nomad: A Framework for Ensuring Data Confidentiality in Mission-critical Cloud-based Applications", in *Data Security in Cloud Computing*, Chapter 2, pp. 19–44, 2017, The Institute of Engineering and Technology (DOI: 10.1049/PBSE007E_ch2) | *Citation count: 1*

- Romero-Mariona, J., <u>Hallman, R.</u>, Kline, M., Palavicini, G., Bryan, J., San Miguel, J., Kerr, L., Major, M., Alvarez, J., "An Approach to Organizational Cybersecurity Acquisition", in *Enterprise Security (LNCS 10131)*, Chapter 9, pp. 203–222, 2017, Springer (DOI: 10.1007/978-3-319-54380-2_9) | *Citation count: 4*

Non-Refereed Technical Documents..

2019:

- San Miguel, J., Kline, M., <u>Hallman, R.</u>, Phan, J., Slayback, S.M., Weeden, C., Romero-Mariona, J., "NIWC Technical Document 3390: Aggregated Machine Learning on Indicators of Compromise", Defense Technical Information Center, July. 2019 | **SSC Pacific Publication Award**

2017:

- Archer, D., Chen, L., Cheon, J.H., Gilad-Bachrach, R., <u>Hallman, R.</u>, Huang, Z., Jiang, X., Kumaresan, R., Malin, B.A., Sofia, H., Song, Y., Wang, S., "Appliations of Homomorphic Encryption",

Homomorphic Encryption Standardization Workshop (Draft Paper), July 2017 | *Citation count: 9*

- Hallman, R., Romero-Mariona, J., Major, M., Kline, M., Kerr, L., Palavicini, G., San Miguel, J., Bryan, J., "SPAWAR Technical Document 3316: Standardized and Repeatable Technology Evaluation for Cybersecurity Acquisition", Defense Technical Information Center, February 2017 | *Citation count: 1*
- Hallman, R., Kline, M., "SPAWAR Technical Report 3061: Risk Metrics for Android Devices", Defense Technical Information Center, February 2017 | *Citation count: 2*

2016:

- Hallman, R., Coronado, B., "SPAWAR Technical Report 3021: DITEC Technology Matching Tool (TMT)", Defense Technical Information Center, August 2016 | *Citation count: 1*

2014:

- Hallman R., Romero-Mariona J., Kline M., San Miguel J., "SPAWAR Technical Document 3288: DITEC User Priority Designation (UPD) Algorithm: An Approach to Prioritizing Technology Evaluations", Defense Technical Information Center, December 2014 | *Citation count: 5*

Other Non-Refereed Publications ....

2016:

- Diallo, M.H., August, M., Hallman, R., Kline, M., Au, H., Slayback, S., Petrie, P., "The Nomad Project: Targeting Security and Availability in the Cloud", in *CHIPS: The Department of the Navy's Information Technology Magazine*, October - December 2016
- Diallo M.H., August M., Hallman R., Kline M., Au H. and Beach V., "The Nomad Project: Targeting Security and Availability Issues in the Cloud", in *US Cybersecurity Magazine*, Vol. 4, No. 11, pp. 30–32, May 2016
- Diallo M.H., August M., Hallman R., Kline M., Au H. and Beach V., Petrie, P., "SSC Pacific's Nomad Technology Targets Cloud Security, Cloud Availability Issues", in *SSC PAC Spotlight*, February 2016

Posters ....

2019:

- Cybenko, G., Hallman, R., "Learning to Deconvolve Complex Behaviors", in *3rd Annual SSC Pacific Workshop on Naval Applications of Machine Learning*, San Diego, Ca, USA, February 2019

2018:

- Diallo, M.H., Rana, V., August, A., Slayback, S., Graves, C. and Hallman, R., "Secure Computation as a Service", in *3rd Homomorphic Encryption Standardization Workshop*, Toronto, Ontario, Canada, October 2018
- San Miguel, J., Kline, M., Hallman, R., Rogers, A., Slayback, S., Chang, S., "Aggregated Machine Learning on Indicators of Compromise in Android Devices", in *Proceedings of the 2018 ACM SIGSAC Conference on Computer and Communications Security (CCS 2018)*, Toronto, Ontario, Canada, October 2018 DOI: 10.1145/3243734.3278494
- DiVita, J., Hallman, R., Morris, R., "An Approach to Botnet Malware Detection Using Nonparametric Bayesian Methods", in *2nd Annual SSC Pacific Workshop on Naval Applications of Machine Learning*, San Diego, Ca, USA, February 2018

Tutorials

2018:

- Hallman, R., Laine, K., Dai, W., Gama, N., Malozemoff, A., Polyakov, Y., Carpov, S., "Building Applications with Homomorphic Encryption", in *Proceedings of the 2018 ACM SIGSAC Conference on Computer and Communications Security (CCS 2018)*, Toronto, Ontario, Canada, October 2018 (DOI: 10.1145/3243734.3264420) | *Slides available at:* http://homomorphicencryption.org/wp-content/uploads/2018/10/CCS-HE-Tutorial-Slides.pdf | *Citation count: 2*

In The News

The following are press articles covering my work.

2018:

- Choi, Y., "Big Data, encrypted as is analysis ... Block private sources of information", in *Donga Science*, March 23, 2018 | *Published in Korean*

2016:

- Conner, K., "C-SEC: Securing Critical Infrastructure" in *CHIPS: The Department of the Navy's Information Technology Magazine*, October - December 2016.

- Petrie, P., "SSC Pacific's Nomad Technology Targets Cloud Security, Cloud Availability Issues", in *United States Navy News Release*, January 13, 2016

Professional Activities

Reviewer Services

I have served as a reviewer for the following:

Project Proposals and Source Selection Evaluation Boards:

- *I have participated in multiple federal project proposal and source selection evaluation boards for large cybersecurity and data privacy programs (more detailed will be provided when appropriate).*

Journals:

- *Future Generation Computer Systems*, Elsevier
- *Information & Communications Technology Express*, Elsevier
- *International Journal of Critical Infrastructure Protection*, Elsevier
- *Journal of King Saud University – Computer and Information Sciences*, Elsevier

Books:

- *Data Analytics for Cybersecurity: Trends, Methodologies and Applications*, Springer, 2017

Conferences & Workshops

2019:

- Special Session on Inter-Disciplinary Research (IDR 2019) co-located with the 4th International Conference on Complexity, Future Information Systems and Risk (COMPLEXIS 2019), Heraklion, Crete, Greece | *Workshop Co-Chair*

2018:

- The 2nd International Workshop on Multimedia Privacy and Security (MPS 2018) (ISBN: 978-1-4503-5988-7) co-located with the 25th ACM Conference on Computer and Communications Security (CCS 2018), Toronto, Ontario, Canada | *Workshop General Co-Chair* | *Workshop website*

available at: https://sites.google.com/view/mps-workshop/

- Workshop on Security and Privacy-Enhanced Big Data (SPEBD 2018) co-located with the 13th International Conference on Availability, Reliability and Security (ARES 2018), Hamburg, Germany | *Workshop Chair*
- Recent Advances on Security, Privacy, Big Data and Internet of Things (SPBDIoT 2018), a special session of the 3rd International Conference on Internet of Things, Big Data and Security (IoTBDS 2018), Funchal, Madeira, Portugal | *Special Session Co-Chair*
- 2nd Annual Workshop on Naval Applications of Machine Learning (NAML 2018), San Diego, California, USA | *Reviewer*

2017:
- The 1st International Workshop on Multimedia Privacy and Security (ISBN: 978-1-4503-5206-2) co-located with the 24th ACM Conference on Computer and Communications Security (CCS 2017), Dallas, Texas, USA | *Workshop Chair* | *Workshop website available at:* https://centers.njit.edu/cybersecurity/CCS_MPS2017/
- The 1st International Workshop on Autonomics and Cloud Security co-located with the IEEE International Conference on Cloud and Autonomic Computing (ICCAC 2017), Tucson, Arizona, USA | *Program Committee*
- ARES Full Paper Session IV – Cryptography at the International Conference on Availability, Reliability and Security (ARES 2017), Reggio Calabria, Italy | *Session Chair*
- The 3rd International Workshop on Data Analytics and Emerging Services (DAES 2017) in conjunction with the International Conference on Engineering and Technology 2017 (ICET 2017), Antalya, Turkey | *Publicity Chair and Program Committee*
- Innovative CyberSecurity and Privacy for Internet of Things, a special session of the 2nd International Conference on Internet of Things, Big Data and Security (IoTBDS 2017), Porto, Portugal | *Session Chair*

2016:
- Enterprise Security Workshop: Risk Analysis and Financial Management, co-located with the 33rd Euro-Asia Management Studies Association (EAMSA) Annual Conference, Suzhou, China | *Workshop Co-Chair*

Standards Development

2017 - present:
- Homomorphic Encryption Standardization Consortium: An Open Industry / Government / Academic Consortium to Advance Secure Computation | *Use Case and Application Development Working Group*

Services

2016 - 2018:
- Advisory Board Member, New Jersey Institute of Technology Cybersecurity Research Center

Outreach, Panel Participation & Invited Talks

2018:
- *"Tales from the Cryptographer"*, AP Computer Science Class Industry Talk, Helix Charter High School, La Mesa, California

- *"Industry and Government Applications of Homomorphic Encryption"* a panel discussion at the Homomorphic Encryption Standardization Workshop Spring Meeting, Cambridge, Massachusetts

2017:
- *"IoDDoS — The Internet of Distributed Denial of Service Attacks: A case study of the Mirai Malware and IoT-based botnets"*, PhD Colloquium, University of Coimbra, Portugal
- *"The Convergence Between Cloud, IoT, Big Data and Security"* a panel discussion at the 2nd International Conference on Internet of Things, Big Data and Security (IoTBDS 2017), Porto, Portugal

Honors & Awards

2019:
- Science Mathematics And Research for Transformation (SMART) Scholarship Award, 2019, U.S. Department of Defense

2018:
- SPAWAR Systems Center Pacific Science & Technology Department 1st Quarter FY'19 Award for Best Technical Document for "Aggregated Machine Learning on Indicators of Compromise"
- 'On-The-Spot' Award for outreach efforts and presentations to Helix Charter High School, La Mesa, California

2017:
- SPAWAR Systems Center Pacific Calendar Year 2016 Publication Award Honorable Mention for "AutoMigrate: A Framework for Developing Intelligent, Self-Managing Cloud Services with Maximum Availability"

2016:
- SPAWAR 'Lightning Bolt' Award for supporting the United States Naval Institute/Armed Forces Communication and Electronics Association (USNI/AFCEA) West 2016 Information Warfare Pavilion
- 'On-The-Spot' Award for supporting the USNI/AFCEA West Conference 2016

2012:
- Marines' Memorial Tribute Scholarship
- Arizona State University Veterans' Scholarship

Skills & Certifications

Computer Skills

Basic: JAVA, PYTHON (e.g., scikit-learn, TensorFlow), MATLAB, Blockchain (e.g., Ethereum – specifically working with smart contract in Solidity)

Intermediate: LATEX, Microsoft Office

Professional Certifications

DAWIA: Engineering (Level I), Science & Technology Management (Level I)

DAU: Contracting Officer's Representative

SPAWAR: Quality Assurance Practitioner

Memberships

The Student Veterans Association of Dartmouth College: 2018–Present

Dartmouth College Principal Investigator Club: 2018–Present

New York Academy of Sciences: 2018–Present

IEEE Computer Society: 2016–2019

Institute for Systems and Technologies of Information, Control and Communication (INSTICC): 2016–Present

Marines' Memorial Association: 2012–2019

Association for Women in Mathematics, Arizona State University Chapter: Charter Member, 2011–2013

Phi Beta Kappa Honor Society: Inducted, 2008