TODD W. ARNOLD

Associate Professor • Army Cyber Institute • Electrical Engineering & Computer Science • US Military Academy, West Point

Army Cyber Institute (ACI)
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Education

COLUMBIA UNIVERSITY, ELECTRICAL ENGINEERING 2017 – 2020   New York, NY
Ph.D., October 2020
M.Phil., February 2020
Thesis: *"Understanding Cloud Network Performance"*
Advisor: Ethan Katz-Bassett

PENNSYLVANIA STATE UNIVERSITY, COMPUTER SCIENCE & ENGINEERING, 2006 – 2008   State College, PA
M.S., May 2008
Thesis: *"A Traffic Engineering Attribute for BGP"*
Advisor: George Kesidis

UNITED STATES MILITARY ACADEMY, COMPUTER SCIENCE, 1997–2001   West Point, NY
B.S., June 2001

Work Experience

2020 – present West Point, NY	*Academy Professor (2022-Present) and Cyber Operations – Research & Engineering (CORE) Lead*, ACI *Senior Research Scientist (2020-2022) and CORE Lead*, ACI *Associate Professor (2023–Present)*, EECS, USMA *Assistant Professor (2020–2023)*, EECS, USMA Lead research scientist for the ACI's CORE Team, focused on improving the Army's Electronic Warfare (EW) and cyber (offensive and defensive) capabilities for both the Army's operational and cyber forces. Supervise, direct, and assign all team research projects, including EW and Cyber professional development and tradecraft, updating Army doctrine (*e.g.,* FM 3-12), and research projects. Serve as a subject matter expert (SME) for the DoD's and Army's cyber force structure, career progression, policy, and doctrine in various working groups.
2016 – 2017 Ft. Meade, MD	*Lead Developer*, Cyber Solutions Development Detachment, 781st MI Battalion First lead developer for the Army's cyber capability development organization. Recruited, supervised, directed, and assigned all team projects and personnel. Led the Army's efforts to identify, assess, and mentor developers and created the developer specialty framework which is now codified as the 17D and 170D MOS's.
2014 – 2016 Ft. Meade, MD	*Director, Capability Development Branch*, Army Cyber Command Served as a SME on the Army's planning team for designing and creating the Army Cyber branch, and as the network design and security SME on multiple joint crisis action/incident response teams. Worked to expand opportunities for Army capability developers. Served as the lead for the Army's initial major weapon systems cyber vulnerabilities evaluation which resulted in a DoD-wide initiative (FY 16 NDAA §1647) and was recognized by the Secretary of Defense.

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2011 – 2014 West Point, NY	*Instructor/Assistant Professor*, EECS, USMA *Research Scientist*, Cyber Research Center, USMA Conducted research in network systems design and security, cyberspace operations, and capabilities. Was recruited by the NSA and OSD to conduct classified research on intelligence collection, communications, and cyberspace capabilities. Created the model for the Cyber branch officer career path and the Army's Cyber Leader Development Program. Taught and designed courses on computer and network security, computer exploitation, and digital forensics.
2008 – 2011 Ft. Belvoir, VA	*Chief of Network Services*, Army Cyber Command/Network Enterprise Technology Command Served as the technical expert at the Army's Global NOSC and Army Cyber Command for engineering and troubleshooting of routing and switched networks, VoIP, ACL configuration, and firewall settings across the Army's 200+ network enclaves. Designed and implemented multiple tools to simplify configuration and resource tracking, which are still in use by the command.
2002 – 2006 Darmstadt, DEU Baghdad, Iraq	*Network Engineer*, 22d Signal Brigade Designed and implemented all tactical data and VoIP networks for V Corps training exercises, Operation Iraqi Freedom (OIF) I, and OIF 05-07 with a customer base of over 130,000 service members. Planned and executed the initial OIF network installation and a subsequent network redesign to improve network performance throughout the entire theater.
2002 – 2002 Darmstadt, DEU	*Platoon Leader*, 32d Signal Battalion

Publications

Refereed Conference Publications

Tiered Cloud Routing: Methodology, Latency, and Improvement
S Lin, Y Zhou, X Zhang, **T Arnold**, R Govindan, X Yang
in *Proceedings of the Association for Computing Machinery (ACM) SIGMETRICS (SIGMETRICS '25)*, July 2025 (17.5% acceptance rate)

ABSTRACT: Tiered Cloud Routing: Methodology, Latency, and Improvement
S Lin, Y Zhou, X Zhang, **T Arnold**, R Govindan, X Yang
in *Abstracts of the ACM SIGMETRICS (SIGMETRICS Abstracts '25)*, July 2025

What's in the Dataset? Unboxing the APNIC per AS User Population Dataset
L Salmatian, C Ardi, V Giotsas, M Calder, E Katz-Bassett, **T Arnold**
Proceedings of the ACM Internet Measurement Conference (IMC) (IMC '24), November 2024 (22% acceptance rate)

Cloud Provider Connectivity in the Flat Internet
T Arnold, J He, W Jiang, M Calder, I Cunha, V Giotsas, E Katz-Bassett
Proceedings of the ACM IMC, October 2020 (25% acceptance rate)

(How Much) Does a Private WAN Improve Cloud Performance?
T Arnold, E Gürmeriçliler, G Essig, A Gupta, M Calder, V Giotsas, E Katz-Bassett
Proceedings of the Institute of Electrical and Electronics Engineers (IEEE) Conference on Computer Communications (INFOCOM '20), July 2020 (20% acceptance rate)

PEERING: Virtualizing BGP at the Edge for Research
B Schlinker, **T Arnold**, I Cunha, E Katz-Bassett
Proceedings of the 15th International Conference on emerging Networking EXperiments and Technologies (CoNEXT '19), December 2019. (17% acceptance rate)
Supported over 60 publications to date at top networking and security conferences, including SIGCOMM, IMC, CCS, NSDI, NDSS, and Usenix Security.

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Beating BGP is Harder Than We Thought
T Arnold, M Calder, I Cunha, A Gupta, HV Madhyastha, and M Schapira, and E Katz-Bassett
Proceedings of the 18th ACM Workshop on Hot Topics in Networks (*HotNets '19*), November 2019 (20% acceptance rate)

Using Virtual Machines to Improve Learning and Save Resources in an Introductory IT Course,
G Stoker, **T Arnold**, P Maxwell
Proceedings of the 14th Annual Conference on Information Technology Education (*SIGITE '13*), October 2013. (40% acceptance rate)

Extending Drive-Thru Data Access by Vehicle-to-Vehicle Relay
J Zhao, **T Arnold**, Y Zhang, G Cao
Proceedings of the Fifth ACM International Workshop on VehiculAr Inter-NETworking (*VANET '08*), *in conjunction with MOBICOM*, September 2008. (26% acceptance rate)

IP Address Passing for VANETs
T Arnold, W Lloyd, J Zhao, G Cao
Proceedings of the Sixth Annual IEEE International Conference on Pervasive Computing and Communications (*PerCom '08*), March 2008 (12% acceptance rate)

Refereed Journal Publications

Who Squats IPv4 Addresses?
L Salamatian, **T Arnold**, I Cunha, J Zhu, Y Zhang, E Katz-Bassett, M Calder
SIGCOMM Computer Communications Review (*CCR*), April 2023.
Awarded Best of CCR at SIGCOMM 2023

Assessing the Army's Cyber Force Structure
JC Fernandes, N Starck, R Shmel, C Suslowicz, J Kallberg, **T Arnold**
US Army War College (*USAWC*) *Quarterly: Parameters*, August 2022.

The Tactical Considerations of Augmented and Mixed Reality Implementation
J Kallberg, V Beitelman, V Mitsuoka, J Pittman, M Boyce, **T Arnold**
Military Review: the Professional Journal of the U.S. Army, April 2022

POWs in the Age of the Internet
J Kallberg, **T Arnold**, S Hamilton, M Visger
Air and Space Operations Review, March 2022

Magazine & Others Publications

Beyond Binaries: Cyber Force Generation and the SOCOM-like Model
S Onken, N Starck, E Lonergan, JC Fernandes, **T Arnold**, M Smith
Irregular Warfare Initiative, Modern Warfare Institute, November 2024

The Case for a Prospective U.S. Cyber Force
E Lonergan, **T Arnold**, N Starck
War on the Rocks, May 2024

Sharing Cyber Capabilities within the Alliance: Interoperability through Structured Pre-Authorization Cyber
J Kallberg, **T Arnold**, S Hamilton
Joint Air Power Competence Centre (*JAPCC*), *Joint Air & Space Power Conference 2022*, June 2022.

Prisoners of War: A Returned Reality
J Kallberg and **T Arnold**
Military Times, Commentary, June 2021.

In Great Power Wars, Americans Could Again Become POWs
J Kallberg and **T Arnold**
Defense One, Opinion, March 2021

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Eroding America from within: Marketing Data Threatens Military Cohesion
J Dawson and **T Arnold**
C4ISRNET, Opinion, February 2021

Government Cyber Breach Shows Need for Convergence
C Suslowicz, J Kallberg, and **T Arnold**
C4ISRNET, Opinion, December 2020.

Unpacking a Flattened Internet
T Arnold
Asia Pacific Network Information Centre (**AP**NIC) *Blog*, guest contributor, December 2020.

Footprint and Performance of Large Cloud Networks
J He, W Jiang, E Gürmeriçliler, G Essig, A Gupta, M Calder, V Giotsas, I Cunha, E Katz-Bassett, **T Arnold**
10th SIGCOMM Networking Networking Women Professional Development Workshop (N2Women'20), August 2020, **Best Poster Runner-up**.

Controlling Real Cloud Experiments from BGP to the Server (and Back)
T Arnold, B Schlinker, I Cunha, E Katz-Bassett
Proceedings of the ACM SIGCOMM Conference Posters and Demos, August 2018 (43% acceptance rate)

Shaping the Army's Cyber Operations Force: the Human Dimension
T Arnold, R Harrison, D Raymond, G Conti
The Cyber Defense Review, February 2015

Towards A Career Path in Cyberspace Operations for Army Officers
T Arnold, R Harrison, G Conti
Small Wars Journal, August 2014

Towards a Cyber Leader Course: Not for the Weak or Faint Hearted
G Conti, M Weigand, DR Skoudis, D Raymond, T Cook, **T Arnold**, D Ragsdale
Report, Army Cyber Center, Vol. 1337 No. III, May 2014

Towards a Cyber Leader Course Modeled on Army Ranger School
G Conti, M Weigand, DR Skoudis, T Cook, **T Arnold**
Small Wars Journal, April 2014

Professionalizing the Army's Cyber Officer Force
T Arnold, R Harrison, G Conti
Report, Army Cyber Center, Vol. 1337 No. II, November 2013

Teaching

*Indicates course director, °Indicates deputy course director

Spring 2025 (USMA)	CS388: Computer Science Independent Study, Advisor/Sponsor (x1)
	CS380: Computer Systems* (1 section)
	CY387: Cyber Science Independent Study, Advisor/Sponsor (x3)
Fall 2024 (USMA)	CS389: Computer Science Independent Study, Advisor/Sponsor (x1)
	CS388: Computer Science Independent Study, Advisor/Sponsor (x1)
	CY388: Cyber Science Independent Study, Advisor/Sponsor (x2)
	CY387: Cyber Science Independent Study, Advisor/Sponsor (x1)

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Spring 2024 (USMA)	CS388: Computer Science Independent Study, Advisor/Sponsor (x1)
	CS387: Computer Science Independent Study, Advisor/Sponsor (x1)
	CS380: Computer Systems* (1 section)
	CY389: Cyber Science Independent Study, Advisor/Sponsor (x1)
	CY388: Cyber Science Independent Study, Advisor/Sponsor (x1)
	XE402: Integrative System Design II, Captone Advisor (x2)
Fall 2023 (USMA)	CS489: Computer Science Honors Research, Advisor/Sponsor (x1)
	CS389: Computer Science Independent Study, Advisor/Sponsor (x1)
	CS388: Computer Science Independent Study, Advisor/Sponsor (x3)
	CS387: Computer Science Independent Study, Advisor/Sponsor (x2)
	CS380: Computer Systems° (1 section)
	CY389: Cyber Science Independent Study, Advisor/Sponsor (x1)
	XE401: Integrative System Design I, Captone Advisor (x2)
Spring 2023 (USMA)	CS388: Computer Science Independent Study, Advisor/Sponsor (x3)
	CS387: Computer Science Independent Study, Advisor/Sponsor (x1)
	CY388: Cyber Science Independent Study, Advisor/Sponsor (x2)
	XE402: Integrative System Design I, Captone Advisor (x1)
Fall 2022 (USMA)	CS389: Computer Science Independent Study, Advisor/Sponsor (x1)
	CS388: Computer Science Independent Study, Advisor/Sponsor (x3)
	CS380: Computer Systems° (1 section)
	CY388: Cyber Science Independent Study, Advisor/Sponsor (x1)
	EE388: Electrical Engineering Independent Study, Advisor/Sponsor (x1)
	XE401: Integrative System Design I, Captone Advisor (x1)
Spring 2022 (USMA)	CS489: Computer Science Honors Research, Advisor/Sponsor (x1)
Fall 2021 (USMA)	CS489: Computer Science Honors Research, Advisor/Sponsor (x3)
	CS380: Computer Systems° (1 section)
Spring 2021 (USMA)	CS489: Computer Science Honors Research, Advisor/Sponsor (x1)
Fall 2020 (USMA)	CS380: Computer Systems° (1 section)
Spring 2014 (USMA)	CS489: Computer Science Honors Research, Advisor/Sponsor (x1)
	CS483: Digital Forensics* (1 section)
	CS482: Information Assurance° (1 section) – Cyber Defense eXercise (CDX) winners
	CS402: Integrative Systems Design II, Capstone Advisor
	IT402: Integrative Systems Design II, Capstone Advisor
Fall 2013 (USMA)	CS401: Integrative Systems Design I, Capstone Advisor
	IT401: Integrative Systems Design I, Capstone Advisor
	IT305: Theory and Practice of Military Information Systems (1 section)
Spring 2013 (USMA)	CS485F: Digital Forensics* (1 section)
	CS482: Information Assurance° (1 section)
	CS402: Integrative Systems Design II, Capstone Advisor
	IT402: Integrative Systems Design II, Capstone Advisor
Fall 2012 (USMA)	CS401: Integrative Systems Design I, Capstone Advisor
	IT485E: Computer Systems Exploitation* (2 sections)
	IT401: Integrative Systems Design I, Capstone Advisor

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Spring 2012 (USMA)   CS485F: Digital Forensics⋆ (1 section)
                            IT305: Theory and Practice of Military Information Systems (1 section)

Fall 2011 (USMA)   IT305: Theory and Practice of Military Information Systems (3 sections)

Service

Professional Service

ACM IMC, Technical Program Committee Member, 2025

ACM IMC, Technical Program Committee Member, 2024

Student Research Competition (SRC) Co-Chair, ACM SIGCOMM 2024

IEEE Access, Reviewer, 2024–Present

Æther: A Journal of Strategic Airpower & Spacepower; Air & Space Operations Review (Æther-ASOR)
    Reviewer, 2023 – Present;
    Perspectives External SME, 2024 – Present

SRC Co-Chair, ACM SIGCOMM 2023

Military Cyber Professionals Association (MCPA) HammerCon: State of Military Cyber Career Fields, Panel Member

ACM IMC 2021, External Reviewer

ACM SIGCOMM CCR, reviewer, 2021 – Present

Cyber Defense Review, Area Editor, 2020 – Present

SRC, Judge, ACM SIGCOMM 2020

Professional Memberships

ACM, member

ACM SIGCOMM, member

ACM Special Interest Group on Security, Audit and Control (SIGSAC), member

IEEE, member

IEEE Communications Society (COMSOC), member

IEEE Computer Society, member

MCPA, member

Association of Old Crows (AOC), member

Upsilon Pi Epsilon–Computer Science Honor Society, member

Departmental and Academy Service

EECS Core Program Steering Committee Member, 2024 – Present

Faculty Council, 2021 – Present

Academic Counselor for Information Technology (EECS USMA), 2011 – 2014

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Awards and Honors

Best of ACM SIGCOMM CCR, 2023: *Who Squats IPv4 Addresses?*

Columbia University Electrical Engineering PhD Collaborative Research Award for 2020.

Armed Forces Communications and Electronics Association (AFCEA) Silver Saint Isidore Cyber Award, 2018

Clark K Ray Award for Excellence in Education, Computer Science for 2014.

Army Chief Information Officer/G-6 Excellence Award for Innovation for 2010.

Grants

National Science Foundation (NSF) Resilient & Intelligent NextG Systems (RINGS): Deployable End-to-End Resilience for Critical Internet Applications via Modular Redundancy (CNS-2148275)
$70,000 (total budget $1,000,000). 2022 – 2025. With Dan Rubenstein, Ethan Katz-Bassett, Henning Schulzrinne (Columbia University).
Principal Investigator (PI) on research project to take an overarching multi-layered, systems-level approach to prepare applications for inevitable component failures by providing a shadow network: pre-planned alternatives ready to deliver critical services should the primary services, networks, or paths fail. The shadow network continually seeks out and analyzes applications and services to identify resilience and combine end-to-end services using a mix of primary and specifically designed shadow components, such that should failures occur, the shadow components can take effective action. By increasing reliability of the network-at-large, users of all Internet applications will benefit by reducing the frequency in which the, "network is down."