

DAVID A. UMPHRESS, PHD

CONTACT INFORMATION

Computer Science and Software Engineering
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EDUCATION

1987 PhD in Computer Science, Texas A&M University
1978 Master of Computing Science, Texas A&M University
1977 Bachelor of Science in Computer Science, Angelo State University (Summa Cum Laude)

EXPERIENCE

1999-Present Auburn University, Department of Computer Science and Software Engineering, Auburn AL
2022 – Present Professor Emeritus
2017-2020 Director, Auburn Cyber Research Center
2016-2022 COLSA Professor of Cybersecurity
2014-2022 Professor
2013-2014 Interim Director, Auburn Cyber Research Center
1999-2014 Associate Professor
1993-1999 Seattle University, Department of Computer Science and Software Engineering, Seattle WA
1997-1999 Associate Professor and Chair
1993-1997 Associate Professor and Director of Software Engineering
1993-2007 United States Air Force Reserve
2001-2007 Researcher and Senior Reservist, Air Force Research Institute, Maxwell AFB AL
1993-2001 Software Process Engineer, US Strategic Command J673, Offutt AFB NE
1978-1993 United States Air Force
1991-1993 Software Engineering Branch Chief, US Strategic Command J673, Offutt AFB NE
1987-1991 Assistant Professor, Department of Electrical and Computer Engineering, Air Force Institute of Technology, Wright-Patterson AFB OH
1983-1987 Computer Support Officer and PhD student, Texas A&M University TX
1978-1983 Software Engineer, Det 1, 1020 Computer Services Squadron, Lowry AFB CO

LICENSURES AND CERTIFICATIONS

2001 - 2015 Certified Software Development Professional, IEEE Computer Society
2015 - present Professional Software Engineering Master Certification, IEEE Computer Society

DISTINCTIONS

- COLSA Professor of Cybersecurity and Information Assurance (2016)
- Gerald and Emily Leischuck Endowed Presidential Award for Excellence in Teaching (2013)
- Outstanding Instructor, Computer Science and Software Engineering (2003, 2007, 2010, 2011, 2013)
- William Walker Teaching Award, Samuel Ginn College of Engineering (2008)
- Air Force Meritorious Service Medal, 2nd Oak Leaf Cluster, United States Air Force
- Field-Grade Reservist of the Half-Year, College of Doctrine, Research, and Education
- Defense Department Meritorious Service Medal, United States Air Force
- Air Force Meritorious Service Medal, 1st Oak Leaf Cluster, United States Air Force
- Instructor of the Quarter, Air Force Institute of Technology (1988, 1990, 1991)
- Air Force Meritorious Service Medal, United States Air Force

SUMMARY OF SOFTWARE ENGINEERING RELATED ACCOMPLISHMENTS

Bio

David A. Umphress, Ph.D., is COLSA Professor of Cyber Security and Information Assurance in Auburn University's Department of Computer Science and Software Engineering. He has worked over the past 40 years in various software and system engineering capacities in military, industry, and academia settings. His scholarship efforts are primarily focused on secure software engineering. His research interests are three-pronged, reflecting his experiences as a practicing software engineer, as a technology policymaker, and as a teacher. The first prong emphasizes the technical facets of software engineering and includes work in secure software provisioning, domain modeling, requirements elicitation, and mobile device development. Complementing the technical aspects, the second prong stresses the mechanics of developing software. Here he specializes in software processes, particularly those that are adaptable to fast-paced small-team environments and result in secure, reliable, and resilient solutions. The third prong strives to tie the previous areas together by applying ideas to an instructional arena. All of his research is coordinated under an umbrella effort titled the Software Engineering Survival Kit, a collection of tools, methods, and processes intended to identify critical, domain-independent engineering methods used in the development and maintenance of software. Dr. Umphress is a retired Air Force officer. He holds the Institute of Electrical and Electronics Engineers (IEEE) Software Engineering Master Certification

Highlights

- Mentoring CyberCorps Scholarship for Service cyber security students.
- Leading University technical research efforts in cyber security.
- Investigating security virtualization using introspection with software containers.
- Researching information leakage within military air missile defense battlespace.
- Employing systems dynamic models to forecasting ripple effect within large networks of cyber events.
- Teaching courses on re-engineering, reverse engineering, computer security, secure software development.
- Developing an agile software development process incorporating security for mobile devices.
- Injecting software engineering processes into undergraduate and graduate small-team projects. Developed and taught a software process course designed to expose students to small- and large-team processes.
- Working as a process consultant advising software development organizations in preparation for assessments.

SELECTED GRANTS AND CONTRACTS

- **David Umphress** (PI, 50% credit), Jason Cuneo (Co-PI), Steve Mills (Co-PI); *Vehicle Wireless Cyber Test Kit*; SRC Corp/US Army; \$147,193; Aug 2020 – May 2021.
- **David Umphress** (PI, 25% credit) and Steve Mills (Co-PI); *Army Cyber Internship Program*; Millennium Corp; \$52,920; May 2020 – Sep 2021.
- Steve Mills (PI) and **David Umphress**(Co-PI, 25% credit); *Digital Engineering and Cyber Innovation, Simulation, Integration, and Validation Environment*; Davidson Technologies; \$800,452; May 2020 – May 2021
- **David Umphress** (PI, 100% credit); *CAN Cybersecurity*; Oak Ridge National Laboratory; \$14,669; Oct 2019 – Jul 2020.
- Rajendran Swamidurai (PI), Uma Kannan (Co-PI), **David Umphress**(Co-PI, 10% credit); *Instilling Cybersecurity Professional Skills in Undergraduate Computing Student from Feedback from Cybersecurity Range Training*; National Science Foundation; \$105,000; Sep 2019 – Oct 2021.
- **David Umphress** (PI, 25% credit), Gerry Dozier (Co-PI), Jason Cuneo (Co-PI), Dean Hendrix (Co-PI); *Cybersecurity Vulnerability Assessment Test Environment*; \$1,037,135; Aug 2018 – Nov 2020.
- **David Umphress** (PI, 50% credit) and Dean Hendrix (Co-PI); *Virtualization of Army Weapon System Critical Computing Hardware and Software*; Dynetics Corp; \$750,000; Jul 2018 – Jul 2021.
- **David Umphress** (PI, 100% credit); *AL OIT Cyber Security Summer Internship Program*; State of Alabama Office of Information Technology; \$22,000; May 2018 – Aug 2021.
- **David Umphress** (PI, 100% credit); *Insight Explorer Vulnerability Assessment*; Hexagon-Intergraph; \$9,028. Oct 2017 – Nov 2017.
- **David Umphress** (PI, 100% credit); *Provenance Assurance Using Currency Primitives*; University of Tennessee at Chattanooga; \$61,008. Oct 2017 – Dec 2018.
- **David Umphress** (PI, 100%); *Gateway Security Assessment*; Vertiv Corp.; \$50,000; May 2017 – Dec 2017.
- Dean Hendrix (PI), **David Umphress** (Co-PI, 33% credit), Daniel Tauritz (Co-PI); *Using AU's Land Grant Mission to Prepare Cybersecurity Professionals*; National Science Foundation; \$4,600,000; Aug 2017 – Aug 2023.

- **David Umphress** (PI, 75% credit) and Anthony Skjellum (Co-PI); *COTS Approach to Information Security. Progeny Systems*; \$109,000; Nov 2016 – Dec 2019.
- **David Umphress** (PI, 75% credit) and Anthony Skjellum (Co-PI); *Cybersecurity for System of Systems Architectures*; US Army/Stevens Institute of Technology; \$198,000; Aug 2016 – Dec 2017
- **David Umphress** (PI, 100%); *Trusted Platform Management (TPM) V2.0 Implementation for Hypervisory Security*; IBM Research. \$40,000. Aug 2016 – Jul 2017.
- Anthony Skjellum (PI), and **David Umphress** (Co-PI, 50% credit). *AMRDEC Cyber Pillars*; COLSA Corp; \$91,507; Feb 2015 - Mar 2016.

SELECTED PUBLICATIONS

Book Chapters

- **David Umphress**. 2015. "Forecasting cyber effects" in *Auburn Speaks: On Cyber and the Digital Doman*. Office of the Vice President of Research and Economic Development. Auburn University. pp 40-47.
- John Leggett, Glen Williams, **David Umphress**. 1989. "Verification of user identity via keyboard characteristics." *Human Factors in Management Information Systems*, Ablex, Norwood, NJ. pp. 29-41.

Refereed Journal Papers

- Pinchen Cui, U. Guinn, Anthony Skjellum, **David Umphress**. 2019. "Blockchain in IoT: Current Trends, Challenges, and Future Roadmap." *Journal of Hardware and Systems Security* 3, 338-364.
- Brent Fox, **David Umphress**, J. Hollingsworth. 2017. "Development and Delivery of an Interdisciplinary **David Umphress**. 2007. "Software as an Exploitable Source of Intelligence." *CrossTalk: The Journal of Defense Software Engineering* 20, no. 6 (2007): 29-30.
- **David Umphress**. 2007. "Cyberspace: The New Air and Space?" *Air & Space Power Journal XXI*, no. 1 (2007): 50-55.
- Idongesit Mkpog-Ruffin and **David Umphress**. 2007. "High-Leverage Techniques for Software Security." *CrossTalk: The Journal of Defense Software Engineering* 20, no. 3 (2007): 18-21.
- **David Umphress**. 2005. "Diving the Digital Dumpster: The Impact of the Internet on Collecting Open Source Intelligence." *Air & Space Power Journal XIX*, no. 4 (2005): 82-91.
- Joseph Loughry and **David Umphress**. "Information leakage from optical emanations." 2002. *ACM Transactions on Information and System Security* 5, no. 3 (2002): 262-289.
- **David Umphress** and Glen Williams. 1985. "Identity verification through keyboard characteristics." *International Journal of Man-Machine Studies* 23, (1985): 263-273.

Refereed Conference Papers

- Osho, John and **David Umphress**. 2022. "IoT Security : Modeling, Development, and Validation of IoT Devices." Proceedings of the Southern Association for Information Systems Annual Conference 2022 (SAIS 2022). Paper 31. <https://aisel.aisnet.org/sais2022/31>.
- Heba Alawneh, **David Umphress**, Anthony Skjellum. 2019. "Android Malware Detection using Neural Networks and Process Control Block Information." *Proceedings of the 14th International Conference on Malicious and Unwanted Software (MALCON 2019)*. 3-12.
- Uma Kannan, Rajendran Swamidurai, **David Umphress**. 2019. "A Proof-of-Concept Model Demonstration of System Level Cyber Attacks on Availability." *Proceedings of the 2018 IEEE Southeastern Conference*.
- Uma Kannan and David Umphress. Modeling Host OSI Layers Cyber-Attacks Using System Dynamics. *Proceeding of the 2016 IEEE Southeast Conference 2016* (30 Mar - 3 Apr 2016, Norfolk VA)
- Uma Kannan and David Umphress. System Dynamic as a Tool for Cyber Security Modeling. *Proceedings of 2016 AlaSim International* (3-5 May 2016, Huntsville AL). Digital paper, unnumbered.
- Ben Denton and **David Umphress**. 2015. "A Survey of Binary Differencing Algorithms." *Proceedings of the 7th Annual Southeastern Cyber Security Summit* (Huntsville AL 3-4 June 2015). Electronic format.
- Robert McGraw, Mark Fowler, **David Umphress**, and Richard MacDonald. 2014. "Cyber threat impact assessment and analysis for space vehicle architecture." *Proceedings of SPIE 9085, Sensors and Systems for Space Applications VII*, 90850K (June 3, 2014); doi:10.1117/12.2055242.
- Idongesit Mkpog-Ruffin, **David Umphress**, John Hamilton, and Juan Gilbert. 2009. "Quantitative software security risk assessment model." *Proceedings of the 2009 ACM Workshop on Quality of Protection*. 31-33.

Technical Articles

- **David Umphress** and Pinchen Cui. 2019. "COTS Approach to Information Security: VM vs Container Cybersecurity Comparison." (US Navy and Progeny Systems).
- **David Umphress** and Frank Cilluffo. 2019. "The Forward Leaning CIO." in *CIO Review*. <https://security.cioreview.com/cxinsight/the-forward-leaning-cio--nid-29792-cid-21.html>

- **David Umphress**. 2018. COTS Approach to Information Security Using DevSecOps and Cloud Technology to Monitor Cyber Integrity of Naval Systems. (US Navy and Progeny Systems).
- **David Umphress**, Dean Hendrix, Drew Batten, Alex King, Joshua Jablonowski, Greg Pinkert, Jordan Sosnowski, Lee Vanrell. 2018. "Blue Force Tacking Vulnerability Assessment." (US Army and Dynetics).
- Augustin Leveugle, Martin Lannelongue, Greg Weaver, **David Umphress**. 2017. "Mining Intelligence on Open Sources." (Francais Ecole Navale).
- Hamza Alkofahi and **David Umphress**. 2017. "Insight Explorer Web Security Assessment". (Hexagon Intergraph.)
- **David Umphress** and Anthony Skjellum. 2017. "RT-165 Cybersecurity for System of Systems Architectures." (US Army and Steven Institute of Technology Systems Engineering Research Center).

RESEARCH STUDENTS SUPERVISED

• PhD students	Graduated	20
• M.S. students	Graduated	94
• Undergraduate research students	Total	17

ACADEMIC ACTIVITY (OVER THE PAST 5 YEARS)

Courses Taught

- Computer and Network Security
- Intro to Engineering for Cybersecurity
- Secure Software Process
- Software Reverse Engineering
- Cybersecurity Capstone Project

Courses Supervised

- Secure Cloud Computing
- Digital Forensics
- Cybersecurity Threats and Countermeasures

SELECTED CYBERSECURITY-RELATED SERVICE ROLES

- 2019 – present: Lead, Cybersecurity Curriculum Committee
- 2018: Technical Co-Chair, 2018 SEC Academic Conference, *Cybersecurity: A Shared Responsibility*
- 2017 – 2020: Director, Auburn Cyber Research Center
- 2017 – 2019: Speaker, Brownbag Cybersecurity Seminar Series
- 2016 – 2018: Instructor, Air Force War College Cybersecurity Seminar
- 2016 – 2017: Lead, Master of Cybersecurity Engineering Degree Team
- 2016 – 2017: Instructor, Air Force Judge Advocate General School Cybersecurity Seminar
- 2015 – present: NSA Center of Academic Excellence CAE-R, CAE-CDE, and CAE-CO PI
- 2015 – 2018: Instructor, Air Force Air Command and Staff College Cybersecurity Seminar
- 2015 – 2018: Cybersecurity Summer Camp for High School Students.

PROFESSIONAL MEMBERSHIP

- Member, American Society of Engineering Education, 2006 - Present
- Member, IEEE Computer Society, 1984 - Present
- Member, Association for Computing Machinery, 1984 - Present
- Member, International Council of Systems Engineers, 2011 - Present
- Member, Institute of Software Engineers, 2007 - 2010; Vice President for Publications, 2007 – 2009