James C. Davis

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Elmore Family School of Electrical and Computer Engineering
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RESEARCH THEME

My research enables safe and secure software engineering for cyber- and cyber-physical systems. My work is grounded in empirical measurements of the software engineering process, product, and usage context. I examine software engineering failures to inform future feats of software engineering.

EDUCATION

Ph.D, Computer Science and Applications   2015–2020
Virginia Tech, Blacksburg, VA

B.Sc. Computer Science, B.Sc. Mathematics   2008–2012
Clarkson University, Potsdam, NY

PROFESSIONAL EXPERIENCE

Assistant Professor   Fall 2020-present
Purdue University — Electrical and Computer Engineering

Intern, Microsoft Research (RiSE group: Cloud Security)   Summer 2019
Microsoft Research, Redmond, WA — Mentored by Patrice Godefroid

Intern, IBM Research (Storage)   Summer 2018
IBM Research, Almaden, CA — Mentored by Deepavali Bhagwat

Graduate Research Assistant   2016–2020
Virginia Tech — Advised by Dongyoon Lee

Software Engineer, IBM (GPFS)   2012–2017
IBM, Poughkeepsie, NY

EXTERNAL RESEARCH GRANTS

TOTAL: $2,380,690. TOTAL AS PI: $783,213. MY TOTAL SHARE: $1,321,210.[1]

[G-1] **NSF: Collaborative Research: EAGER: CET: Exploring The Risks and Rewards of Large Language Models in Enabling Energy-Efficient Data Center Software Infrastructure**

PI (Co-PI: Yung-Hsiang Lu)

US National Science Foundation

2024–2026. $149,976.

[G-2] **Rolls Royce: Facilitating Effective Dynamic Analysis of Embedded Software**

Co-PI (PI: Aravind Machiry)

Contract with Rolls Royce

2024-2025. $150,000.

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[1]Calculation: *Total* is the sum of all awards to Purdue. *Total as PI* is the sum of all awards to Purdue on which I am the PI — not all of these funds are controlled by me. *My total share* is the sum of funds I control across all awards.

[G-3] **Unrestricted Gift: Improving OSS Supply Chain Security by Promoting Software Signing**
Co-PI (PI: Santiago Torres-Arias)
Google, LLC
2023. $200,000.

[G-4] **Rolls Royce: Dynamic Security Analysis of Embedded Software Systems**
Co-PI (PI: Aravind Machiry)
Contract with Rolls Royce
2023-2024. $150,000.

[G-5] **Efficient Computer Vision for Edge Devices**
Co-PI (PI: Yung-Hsiang Lu)
Contract with Cisco
2023-2024. $179,941

[G-6] **Unrestricted Gift: Machine Learning Reproducibility**
PI
Google, LLC
2022. $80,000.

[G-7] **NSF #2229703: POSE: Phase I: Scoping An Open-Source Ecosystem Around Proactive Software Supply Chain Monitoring**
Co-PI (PI: Santiago Torres-Arias)
US National Science Foundation
2022–2023. $300,000.

[G-8] **Cisco: Trustworthy Re-use of Pre-Trained Neural Networks**
PI (Co-PI: Yung-Hsiang Lu)
Contract with Cisco
2022–2023. $179,237.

[G-9] **Cisco: Monitor and manage security risks in software supply chains with Sigstore**
Co-PI (PI: Santiago Torres-Arias)
Contract with Cisco
2022–2023. $184,536.

[G-10] **NSF #2135156: Collaborative Research: SaTC: CORE: Small: Improving Sanitization and Avoiding Denial of Service Through Correct and Safe Regexes**
PI (Co-PI: Dongyoon Lee)
US National Science Foundation
2022–2025. Purdue's share: $274,000.

[G-11] **Rolls Royce: Dynamic Analysis of Embedded Firmware**
Co-PI (PI: Aravind Machiry)
Contract with Rolls Royce
2021-2022. $175,000.

[G-12] NSF #2107230: Collaborative Research: OAC Core: Advancing Low-Power Computer Vision at the Edge

Co-PI (PI: Yung-Hsiang Lu)

US National Science Foundation

2021–2024. Purdue's share: $258,000.

[G-13] Unrestricted gift to support research on machine learning reproducibility

PI (Co-PI: Yung-Hsiang Lu)

Google, LLC

2020. $80,000 + $20,000.

INTERNAL RESEARCH GRANTS

TOTAL: $234,431.

[IG-1] Exploring the Impact and the Use of Generative Models in Computer Engineering Education

Co-PI (PI: Machiry, Other Co-PIs: Zoltowski, Hess, Lu)

Office of the Provost, through the program "AI in teaching and learning grants"

2023-2024. $79,431.

[IG-2] Revamping the CompE Curriculum for Secure Software Engineering

PI (Co-PIs: Machiry, Torres-Arias, Bagchi)

ECE Agile Reform of Curriculum program, enabled by Elmore Family gift

2021-2022. $150,000.

[IG-3] Intercultural Engineering Education for Software Engineers

PI (Co-PI: Kirsten Davis)

Purdue University VEIL Program

2020. $5,000.

REFEREED CONFERENCE PUBLICATIONS[2]

[C-1] J. Jones, W. Jiang, N. Synovic, G.K. Thiruvathukal, and **J.C. Davis**. *What do we know about Hugging Face? A systematic literature review and quantitative validation of qualitative claims.* Proceedings of the 18th ACM/IEEE International Symposium on Empirical Software Engineering and Measurement (ESEM'24). 24% acceptance rate (34/139). 12 pages.

[C-2] L. Franke, H. Liang, S. Farzanehpour, A. Brantly, **J.C. Davis**, and C. Brown. *An Exploratory Mixed-methods Study on General Data Protection Regulation (GDPR) Compliance in Open-Source Software.* Proceedings of the 18th ACM/IEEE International Symposium on Empirical Software Engineering and Measurement (ESEM'24). 24% acceptance rate (34/139). 12 pages.

[C-3] J. Chen, D. Anandayuvaraj, **J.C. Davis**, and S. Rahaman. *On the Contents and Utility of IoT Cybersecurity Guidelines.* Proceedings of the ACM on Software Engineering (PACMSE), Issue FSE 2024 (FSE'24). 26% acceptance rate (121/474). 24 pages.

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[2]Here and elsewhere, my research mentees are underlined. These are students whose work I supervised during the research project. My name is in given in **bold**.

[C-4] T.R. Schorlemmer, K.G. Kalu, L. Chigges, K.M. Ko, E.A.M.A. Ishgair, S. Bagchi, S. Torres-Arias, and **J.C. Davis**. *Signing in Four Public Software Package Registries: Quantity, Quality, and Influencing Factors.* Proceedings of the 45th IEEE Symposium on Security and Privacy (S&P'24). 18% acceptance rate (261/1463). 16 pages.

[C-5] W. Maxam and **J.C. Davis**. *An Interview Study on Third-Party Cyber Threat Hunting Processes in the U.S. Department of Homeland Security.* Proceedings of the 33rd USENIX Security Symposium (USENIX Security'24). 15?% acceptance rate (150?/990?). 18 pages.

[C-6] W. Jiang, J. Yasmin, J. Jones, N. Synovic, J. Kuo, N. Bielanski, Y. Tian, G.K. Thiruvathukal, and **J.C. Davis**. *PeaTMOSS: A Dataset and Initial Analysis of Pre-Trained Models in Open-Source Software.* Proceedings of the 21st Annual Conference on Mining Software Repositories (MSR'24). 29% acceptance rate (42/146). 13 pages.

[C-7] W. Jiang, N. Synovic, M. Hyatt, T.R. Schorlemmer, R. Sethi, Y.H. Lu, G.K. Thiruvathukal, and **J.C. Davis**. *An Empirical Study of Pre-Trained Model Reuse in the Hugging Face Deep Learning Model Registry.* Proceedings of the ACM/IEEE 45th International Conference on Software Engineering (ICSE'23). 26% acceptance rate (208/796). 13 pages.

[C-8] P.C. Amusuo, R.A.C. Méndez, Z. Xu, A. Machiry, and **J.C. Davis**. *Systematically Detecting Packet Validation Vulnerabilities in Embedded Network Stacks.* Proceedings of the 38th IEEE/ACM International Conference on Automated Software Engineering (ASE'23). 21% acceptance rate (134/629). 13 pages.

[C-9] S.A. Hassan, Z. Aamir, D. Lee, **J.C. Davis**, and F. Servant. *Improving Developers' Understanding of Regex Denial of Service Tools through Anti-Patterns and Fix Strategies.* Proceedings of the 44th IEEE Symposium on Security and Privacy (S&P'23). 18 pages.

[C-10] **J.C. Davis**, P. Jajal, W. Jiang, T.R. Schorlemmer, N. Synovic, and G.K. Thiruvathukal. *Reusing Deep Learning Models: Challenges and Directions in Software Engineering.* Proceedings of the IEEE John Vincent Atanasoff Symposium on Modern Computing (JVA'23). 12 pages.

[C-11] A. Goel, C. Tung, N. Eliopoulos, X. Hu, G.K. Thiruvathukal, **J.C. Davis**, and Y.H. Lu. *Directed Acyclic Graph-based Neural Networks for Tunable Low-Power Computer Vision.* Proceedings of the ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED'22). 6 pages.

[C-12] E. Barlas, X. Du, and **J.C. Davis**. *Exploiting Input Sanitization for Regex Denial of Service.* Proceedings of the ACM/IEEE 44th International Conference on Software Engineering (ICSE'22). 26% acceptance rate (197/751). 13 pages.

[C-13] Q. Xu, **J.C. Davis**, Y.C. Hu, and A. Jindal. *An Empirical Study on the Impact of Parameters on Mobile App Energy Usage.* Proceedings of the 29th IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER'22). 36% acceptance rate (72/199). 12 pages.

[C-14] A. Goel, C. Tung, X. Hu, G.K. Thiruvathukal, **J.C. Davis**, and Y.H. Lu. *Efficient Computer Vision on Edge Devices with Pipeline-Parallel Hierarchical Neural Networks.* Proceedings of the 27th Asia and South Pacific Design Automation Conference (ASP-DAC'22). 37% acceptance rate (95/260). 6 pages.

[C-15] A. Goel, C. Tung, X. Hu, H. Wang, **J.C. Davis**, Thiruvathukal, and Lu. *Low-Power Multi-Camera Object Re-Identification using Hierarchical Neural Networks.* Proceedings of the ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED'21). 6 pages.

[C-16] **J.C. Davis**, F. Servant, and D. Lee. *Using Selective Memoization to Defeat Regular Expression Denial of Service (ReDoS).* Proceedings of the 42nd IEEE Symposium on Security and Privacy (IEEE S&P'21). 12% acceptance rate (115/952). 17 pages.

[C-17] A. Cha, E. Wittern, G. Baudart, **J.C. Davis**, L. Mandel, and J. Laredo. *A Principled Approach to GraphQL Query Cost Analysis*. Proceedings of the 28th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE'20). 28% acceptance rate (101/360). 12 pages. *ACM Distinguished Paper Award*.

[C-18] L. Rupprecht, **J.C. Davis**, C. Arnold, Y. Gur, and D. Bhagwat. *Improving Reproducibility of Data Science Pipelines through Transparent Provenance Capture*. Proceedings of the 46th International Conference on Very Large Data Bases (VLDB'20 Industry track). 15 pages.

[C-19] **J.C. Davis**, D. Moyer, A. Kazerouni, and D. Lee. *Testing Regex Generalizability And Its Implications: A Large-Scale Many-Language Measurement Study*. Proceedings of the 34th IEEE/ACM International Conference on Automated Software Engineering (ASE'19). 21% acceptance rate (91/435). 13 pages.

[C-20] L. Michael, J. Donohue, **J.C. Davis**, D. Lee, and F. Servant. *Regexes are Hard: Decision-making, Difficulties, and Risks in Programming Regular Expressions*. Proceedings of the 34th IEEE/ACM International Conference on Automated Software Engineering (ASE'19). 21% acceptance rate (91/435). 12 pages. *ACM Distinguished Paper Award*.

[C-21] **J.C. Davis**, L. Michael, C. Coghlan, F. Servant, and D. Lee. *Are Regular Expressions a Lingua Franca? An Empirical Study on the Re-use and Portability of Regular Expressions*. Proceedings of the 27th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE'19). 24% acceptance rate (97/371). 12 pages.

[C-22] E. Wittern, A. Cha, **J.C. Davis**, G. Baudart, L. Mandel. *An Empirical Study of GraphQL Schemas*. Proceedings of the 17th International Conference on Service-Oriented Computing (ICSOC'19). 15% acceptance rate (28/183). 16 pages.

[C-23] X. Fu, T. Ghaffar, **J.C. Davis**, and D. Lee. *EdgeWise: A Better Stream Processing Engine for the Edge*. 2019 USENIX Annual Technical Conference (USENIX ATC'19). 20% acceptance rate (71/356). 17 pages.

[C-24] **J.C. Davis**, C. Coghlan, F. Servant, and D. Lee. *The Impact of Regular Expression Denial of Service (REDOS) in Practice: an Empirical Study at the Ecosystem Scale*. Proceedings of the 26th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE'18). 21% acceptance rate (61/289). 11 pages. *ACM Distinguished Paper Award*.

[C-25] **J.C. Davis**, E.R. Williamson, and D. Lee. *A Sense of Time for JavaScript and Node.js: First-Class Timeouts as a Cure for Event Handler Poisoning*. Proceedings of the 27th USENIX Security Symposium (USENIX Security'18). 19% acceptance rate (100/520). 17 pages.

[C-26] **J.C. Davis**, A. Thekumparampil, and D. Lee. *Node.fz: Fuzzing the Server-Side Event-Driven Architecture*. Proceedings of the Twelfth European Conference on Computer Systems (EuroSys'17). 21% acceptance rate (41/200). 16 pages.

REFEREED JOURNAL ARTICLES

[J-1] X. Hu, Z. Jiao, A. Kocher, Z. Wu, J. Liu, **J.C. Davis**, G.K. Thiruvathukal, Y.H. Lu. *Evolution of Winning Solutions in the 2021 Low-Power Computer Vision Challenge*. IEEE Computer, 2023 (Computer'23). 6 pages.

[J-2] A. Goel, C. Tung, N. Eliopoulos, A. Wang, **J.C. Davis**, G.K. Thiruvathukal, Lu. *Tree-based Unidirectional Neural Networks for Low-Power Computer Vision*. IEEE Design & Test, 2022 (IEEE D&T'22). 6 pages.

[J-3] K. Davis, J. Deters, D. Ozkan, **J. Davis**, and H. Murzi. *Applying Experiential Learning Theory to Understand Study Abroad Leaders' Experiences Using Real-Time Perspectives*. Frontiers: The Interdisciplinary Journal of Study Abroad, Vol. 34, No. 2, 2022 (Frontiers'22). 31 pages.

[J-4] S. Herbold, A. Trautsch, B. Ledel, A. Aghamohammadi, T.A. Ghaleb, K.K. Chahal, T. Bossenmaier, B. Nagaria, P. Makedonski, M.N. Ahmadabadi, K. Szabados, H. Spieker, M. Madeja, N. Hoy, V. Lenarduzzi, S. Wang, G. Rodriguez-Perez, R. Colomo-Palacios, R. Verdecchia, P. Singh, Y. Qin, D. Chakroborti, W. Davis, V. Walunj, H. Wu, D. Marcilio, O. Alam, A. Aldaeej, I. Amit, B. Turhan, S. Eismann, A.K. Wickert, I. Malavolta, M. Sulir, F. Fard, A.Z. Henley, S. Kourtzanidis, E. Tüzün, C. Treude, S.M. Shamasbi, I. Pashchenko, M. Wyrich, **J.C. Davis**, A. Serebrenik, E. Albrecht, E.U. Aktas, D. Strüber, and J. Erbel. *A Fine-grained Data Set and Analysis of Tangling in Bug Fixing Commits.* Empirical Software Engineering, 2022 (EMSE'22). 55 pages.

[J-5] A. Kazerouni, **J. Davis**, A. Basak, C. Shaffer, F. Servant, and S. Edwards. *Fast and Accurate Incremental Feedback for Students' Software Tests Using Selective Mutation Analysis.* Journal of Systems and Software, 2021 (JSS'21). 22 pages.

[J-6] D. Ozkan, K. Davis, **J. Davis**, M. James, H. Murzi, and D. Knight. *Expectations and Experiences of Short-Term Study Abroad Leadership Teams.* Journal of International Engineering Education, 2020 (JIEE'20). 34 pages.

OTHER REFEREED WORKS: VISIONS, TOOLS, PRELIMINARY WORKS, COMPETITIONS

[W-1] S. Joshi, P. Mukherjee, K.A. Davis, and **J.C. Davis**. *Introducing Systems Thinking as a Framework for Teaching and Assessing Threat Modeling Competency.* Proceedings of the 2024 Annual Conference and Exposition of the American Society for Engineering Education (ASEE'24). ??% acceptance rate (??). 30? pages.

[W-2] B.A. Tanay, L. Arinze, S. Joshi, K.A. Davis, and **J.C. Davis**. *An Exploratory Study on Upper-Level Computing Students' Use of Large Language Models as Tools in a Semester-Long Project.* Proceedings of the 2024 Annual Conference and Exposition of the American Society for Engineering Education (ASEE'24). ??% acceptance rate (??). 28? pages.

[W-3] J. Srinivasan, S.R. Tanksalkar, P. Amusuo, **J.C. Davis**, and A. Machiry. *Towards Rehosting Embedded Applications as Linux Applications.* Proceedings of the 53rd Annual IEEE/IFIP International Conference on Dependable Systems and Networks — Disrupt track (DSN-Disrupt'23). 47% acceptance rate (17/36). 5 pages.

[W-4] M. Shen, **J.C. Davis**, and A. Machiry. *Towards Automated Identification of Layering Violations in Embedded Applications (WIP).* Proceedings of the 24th ACM SIGPLAN/SIGBED International Conference on Languages, Compilers, and Tools for Embedded Systems — Work-In-Progress Track (LCTES-WIP'23). 40% acceptance rate (14/35). 5 pages.

[W-5] K.G. Kalu, T.R. Schorlemmer, S. Chen, K.A. Robinson, and **J.C. Davis**. *Reflecting on the use of the Policy-Process-Product Theory in Empirical Software Engineering.* Proceedings of the 31st ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering — Ideas, Visions, and Reflections track (ESEC/FSE-IVR'23). 48% acceptance rate (13/27). 5 pages.

[W-6] W. Jiang*, N. Synovic*, P. Jajal, T.R. Schorlemmer, A. Tewari, B. Pareek, G.K. Thiruvathukal, and **J.C. Davis**. *PTMTorrent: A Dataset for Mining Open-source Pre-trained Model Packages.* Proceedings of the 20th Annual Conference on Mining Software Repositories — Data and Tool Showcase Track (MSR-Data'23). 54% acceptance rate (23/42). 5 pages.

[W-7] T. Singla, D. Anandayuvaraj, K.G. Kalu, T.R. Schorlemmer, and **J.C. Davis**. *An Empirical Study on Using Large Language Models to Analyze Software Supply Chain Security Failures.* Proceedings of the 2nd ACM Workshop on Software Supply Chain Offensive Research and Ecosystem Defenses (SCORED'23). 67% acceptance rate (14/21). 11 pages.

[W-8] D. Anandayuvaraj, P. Thulluri, J. Figueroa, H. Shandilya, and **J.C. Davis**. *Incorporating Failure Knowledge into Design Decisions for IoT Systems: A Controlled Experiment on Novices.* Proceedings of the 5th International Workshop on Software Engineering Research & Practices for the Internet of Things (SERP4IoT'23). 5 pages.

[W-9] D. Montes, P. Peerapatanapokin, J. Schultz, C. Guo, W. Jiang, and **J.C. Davis**. *Discrepancies among Pre-trained Deep Neural Networks: A New Threat to Model Zoo Reliability.* Proceedings of the 30th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering — Ideas, Visions, and Reflections track (ESEC/FSE-IVR'22). 25% acceptance rate (7/28). 5 pages.

[W-10] W. Jiang, N. Synovic, R. Sethi, A. Indarapu, M. Hyatt, T.R. Schorlemmer, G.K. Thiruvathukal, and **J.C. Davis**. *An Empirical Study of Artifacts and Security Practices in the Pre-trained Model Supply Chain.* Proceedings of the 1st ACM Workshop on Software Supply Chain Offensive Research and Ecosystem Defenses (SCORED'22). 57% acceptance rate (12/21). 10 pages.

[W-11] D. Anandayuvaraj and **J.C. Davis**. *Reflecting on Recurring Failures in IoT Development.* Proceedings of the 37th IEEE/ACM International Conference on Automated Software Engineering — New Ideas and Emerging Results track (ASE-NIER'22). 36% acceptance rate (18/50). 5 pages.

[W-12] P. Amusuo, A. Sharma, S.R. Rao, A. Vincent, and **J.C. Davis**. *Reflections on Software Failure Analysis.* Proceedings of the 30th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering — Ideas, Visions, and Reflections track (ESEC/FSE-IVR'22). 25% acceptance rate (7/28). 6 pages.

[W-13] C. Okafor*, T.R. Schorlemmer*, S. Torres-Arias, and **J.C. Davis**. *SoK: Analysis of Software Supply Chain Security by Establishing Secure Design Properties.* Proceedings of the 1st ACM Workshop on Software Supply Chain Offensive Research and Ecosystem Defenses (SCORED'22). 57% acceptance rate (12/21). 10 pages.

[W-14] N. Synovic, M. Hyatt, R. Sethi, S. Thota, Shilpika, A.J. Miller, W. Jiang, E.S. Amobi, A. Pinderski, K. Läufer, N.J. Hayward, N. Klingensmith, **J.C. Davis**, and G.K. Thiruvathukal. *Snapshot Metrics Are Not Enough: Analyzing Software Repositories with Longitudinal Metrics.* Proceedings of the 37th IEEE/ACM International Conference on Automated Software Engineering — Demonstrations track (ASE-Tool Demonstrations'22). 56% acceptance rate (23/41). 4 pages.

[W-15] N. Gopalakrishna, D. Anandayuvaraj, A. Detti, F. Bland, S. Rahaman, and **J.C. Davis**. *"If security is required": Engineering and Security Practices for Machine Learning-based IoT Devices.* Proceedings of the 4th International Workshop on Software Engineering Research & Practices for the Internet of Things (SERP4IoT'22). 8 pages.

[W-16] **J.C. Davis**, P. Amusuo, and J.R. Bushagour. *Experience Paper: A First Offering of Software Engineering.* Proceedings of the 1st International Workshop on Designing and Running Project-Based Courses in Software Engineering Education (ICSE-DREE'22). 5 pages.

[W-17] N. Veselsky, J. West, I. Ahlgren, A. Goel, W. Jiang, K. Lee, Y. Kim, **J.C. Davis**, G.K. Thiruvathukal, and N. Klingensmith. *Establishing Trust in Vehicle-to-Vehicle Coordination: A Sensor Fusion Approach.* Proceedings of the 2nd Workshop on Data-Driven and Intelligent Cyber-Physical Systems for Smart Cities (DI-CPS) (DI-CPS'22). 6 pages.

[W-18] J.M. Winkler, A. Agarwal, C. Tung, D.R. Ugalde, Y.J. Jung, and **J.C. Davis**. *A Replication of "DeepBugs: A Learning Approach to Name-based Bug Detection".* Proceedings of the 29th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE'21 Artifact). 1 pages.

[W-19] **J.C. Davis**. *On the Impact and Defeat of Regex DoS*. ACM Student Research Competition, 2019-2020 Grand Finals. ***Second place, graduate student division***.

[W-20] **J.C. Davis**. *Rethinking Regex Engines to Address ReDoS*. ACM Student Research Competition, 2019-2020 at ESEC/FSE'19. ***First place, graduate student division***.

[W-21] L. Rupprecht, **J.C. Davis**, C. Arnold, A. Lubbock, D. Tyson, and D. Bhagwat. *Ursprung: Provenance for Large-Scale Analytics Environments*. Proceedings of the 2019 International Conference on Management of Data (SIGMOD'19 Demo). 4 pages.

[W-22] **J.C. Davis**, G. Kildow, and D. Lee. *The Case of the Poisoned Event Handler: Weaknesses in the Node.js Event-Driven Architecture*. Proceedings of the 10th European Workshop on Systems Security (EuroSec'17). 38% acceptance rate (9/24). 6 pages.

PATENTS

[Pa-1] **J.C. Davis**, W. Davis. *Determining a validity of an event emitter based on a rule*. IBM, US Patent 11,875,185 B2. Granted Jan. 16, 2024.

[Pa-2] W. Davis, **J.C. Davis**. *Verification of the Integrity of Data Files Stored in Copy-on-Write (CoW) Based File System Snapshots*. IBM, U.S. patent 11,176,090 B2. Granted Nov. 16, 2021.

[Pa-3] **J.C. Davis**, W. Davis. *Injection of Simulated Hardware Failure(s) in a File System for Establishing File System Tolerance-to-Storage-Failure(s)*. IBM, U.S. patent 11,023,341 B2. Granted Jun. 1, 2021.

[Pa-4] **J.C. Davis**, L. Rupprecht, D. Bhagwat, C. Arnold, W. Sawdon. *Performing Hierarchical Provenance Collection*. IBM, U.S. patent 10,891,174 B1. Granted Jan. 12, 2021.

[Pa-5] **J.C. Davis**, W. Davis. *File Metadata Verification in a Distributed File System*. IBM, U.S. patent 10,678,755 B2. Granted Jun. 9, 2020.

[Pa-6] W. Davis, **J.C. Davis**. *Testing of Lock Managers in Computing Environments*. IBM, U.S patent 10,061,777 B1. Granted Aug. 28, 2018.

[Pa-7] **J.C. Davis**, W. Davis, F. Knop. *Detection of File Corruption in a Distributed File System*. IBM, U.S. patent 10,025,788. Granted Jul. 17, 2018.

BOOK CHAPTERS

[B-1] **J.C. Davis**. (2023). Epilogue: The Computer Engineer as Tool-User. In Y.H. Lu & G.K. Thiruvathukal, *Intermediate C Programming* (3rd edition, pp. 439–442). CRC Press.

TECHNICAL REPORTS

[R-1] P.C. Amusuo, K.A. Robinson, S. Torres-Arias, L. Simon, **J.C. Davis**. *Preventing Supply Chain Vulnerabilities in Java with a Fine-Grained Permission Manager*. `https://arxiv.org/pdf/2310.14117.pdf`. 2023.

[R-2] M. Shen, A. Pillai, B.A. Yuan, **J.C. Davis**, and A. Machiry. *An Empirical Study on the Use of Static Analysis Tools in Open Source Embedded Software*. `https://arxiv.org/abs/2310.00205`. 20232023.

[R-3] W. Jiang, C. Cheung, G.K. Thiruvathukal, and **J.C. Davis**. *Exploring Naming Conventions (and Defects) of Pre-trained Deep Learning Models in Hugging Face and Other Model Hubs*. `https://arxiv.org/abs/2310.01642`. 2023.

[R-4] J. Chen, D. Anandayuvaraj, **J.C. Davis**, and S. Rahaman. *A Unified Taxonomy and Evaluation of IoT Security Guidelines.* `https://arxiv.org/abs/2310.01653`. 2023.

[R-5] P. Jajal, W. Jiang, A. Tewari, J. Woo, Y.H. Lu, G.K. Thiruvathukal, and **J.C. Davis**. *Analysis of Failures and Risks in Deep Learning Model Converters: A Case Study in the ONNX Ecosystem.* `https://arxiv.org/abs/2303.17708`. 2023.

[R-6] W. Jiang, V. Banna, N. Vivek, A. Goel, N. Synovic, G.K. Thiruvathukal, and **J.C. Davis**. *Challenges and Practices of Deep Learning Model Reengineering: A Case Study on Computer Vision.* `https://arxiv.org/abs/2303.07476`. 2023.

[R-7] V. Banna, A. Chinnakotla, Z. Yan, A. Vegesana, N. Vivek, K. Krishnappa, W. Jiang, Y.H. Lu, G.K. Thiruvathukal, and **J.C. Davis**. *An Experience Report on Machine Learning Reproducibility: Guidance for Practitioners and TensorFlow Model Garden Contributors.* `https://arxiv.org/abs/2107.00821`. 2021.

POSTERS

[Ps-1] L. Franke, H. Liang, A. Brantly, **J.C. Davis**, and C. Brown. *A First Look at the General Data Protection Regulation (GDPR) in Open-Source Software.* Proceedings of the ACM/IEEE 46th International Conference on Software Engineering — Poster Track (**ICSE-Poster'24**).

[Ps-2] S.R. Tanksalkar, J. Srinivasan, S. Danduri, P. Amusuo, **J.C. Davis**, and A. Machiry. *LeMix: Rehosting Embedded Systems at Linux Applications for Effective Vulnerability Detection.* 2024 Purdue CERIAS Symposium (**CERIAS'24**). *Award: Best Poster — 1st-place.*

[Ps-3] K.G. Kalu, S. Torres-Arias, and **J.C. Davis**. *Navigating Software Supply Chain Risks: Practitioner Perspectives on Software Signing.* 2024 Purdue CERIAS Symposium (**CERIAS'24**).

[Ps-4] T.R. Schorlemmer, W. Jiang, and **J.C. Davis**. *Machine Learning Supply Chain Security.* 2023 Purdue CERIAS Symposium (**CERIAS'23**). *Award: Best Poster — 2nd-place.*

[Ps-5] W. Jiang, T.R. Schorlemmer, and **J.C. Davis**. *Trustworthy Re-use of Pre-trained Neural Networks.* 2023 Purdue CERIAS Symposium (**CERIAS'23**).

[Ps-6] W. Maxam and **J.C. Davis**. *Plan for an evaluation of government cyber threat hunting processes.* 2022 Purdue CERIAS Symposium (**CERIAS'22**).

[Ps-7] N. Hornbrook and **J.C. Davis**. *An Intercultural Engineering Module for Software Engineers.* 2021 Annual Colloquium for International Engineering Education (**ACIEE'21**).

[Ps-8] N. Vivek, A. Chinnakotla, V. Banna, A. Vegesana, Z. Yan, **J.C. Davis**, Y.H. Lu, and G.K. Thiruvathukal. *Exemplars for Machine Learning: Towards Software Engineering & Reproducibility.* SIAM Conference on Computational Science and Engineering (**CSE'21**).

COURSES DESIGNED* OR RE-DESIGNED†

†**ECE 461 – Software Engineering**　　　　　　　　　　　　　Launched Fall 2021
Purdue University

***ECE 595 – Advanced Software Engineering**　　　　　　　Launched Spring 2021
Purdue University

†**ECE 30862 – Software Engineering Tools**　　　　　　　　Revamped Fall 2021
Purdue University

COURSES TAUGHT

ECE 461 – Software Engineering   Fall 2021, Spring 2023, Fall 2023
Purdue University

ECE 595 – Advanced Software Engineering   Spring 2021, Spring 2022, Spring 2024
Purdue University

ECE 368 – Data Structures   Fall 2020
Purdue University

Vertically Integrated Project: Open-Source TensorFlow Software F20, S21, F21, S22, F22, S23, F23
Purdue University

Vertically Integrated Project: Software Engineering w/Pre-Trained Models Spring 2024, Fall 2024
Purdue University

Vertically Integrated Project: SafeRegex   Fall 2020, Spring 2021
Purdue University

CS 3114 – Data Structures and Algorithms   Fall 2019
Virginia Tech

CS 1064 – Introduction to Programming in Python   Spring 2019
Virginia Tech

Rising Sophomore Abroad Program (Track Leader)   Spring 2018, Spring 2019
Virginia Tech

PHD AND MASTER'S STUDENTS

CURRENT

Wenxin Jiang	PhD	Spring 2021–present
Paschal Amusuo	PhD	Fall 2021–present
Dharun Anandayuvaraj	PhD	Fall 2021–present
Purvish Jajal (with Y.H. Lu)	PhD	Fall 2022–present
Kelechi Gabriel Kalu	PhD	Spring 2023–present
Berk Çakar	PhD	Fall 2024–present
Huiyun Peng	PhD	Fall 2024–present
Sofia Okorafor, US Navy	MSc	Fall 2024–present

GRADUATED

Jason Jones	MSc	Spring 2024
Taylor Schorlemmer, US Army	MSc	Spring 2024
William Maxam, US Coast Guard	MSc	Spring 2023
Geoffrey Cramer	MSc	Spring 2023

INVITED TALKS

Reusing Pre-Trained Neural Networks: A Software Engineering Perspective   2024

The University of Arizona. Tucson, AZ

Failure-Aware SW Development Lifecycles: Opportunities for Intra-/Inter-Org. Learning 2024
Purdue CERIAS External Advisory Board

An Interview Study on Third-Party Cyber Threat Hunting Processes in the U.S. Department of Homeland Security 2024
Purdue CERIAS Annual Symposium

Practices and Hazards in Reusing Pre-Trained Neural Networks: A SWEng Perspective 2024
Michigan Technical University. Houghton, MI

Practices and Hazards in Reusing Pre-Trained Neural Networks: A SWEng Perspective 2023
Carnegie Mellon University. Pittsburgh, PA

Software reuse practices and hazards in the pre-trained neural network supply chain 2023
The University of Notre Dame. South Bend, IN

Missing Links in the Pre-Trained Neural Network Supply Chain 2023
Argonne National Laboratories. Lemont, IL

Analysis of Failures and Risks in Deep Learning Model Converters[3] 2023
ONNX Community Meetup, NVIDIA headquarters. Santa Clara, CA

Towards a Trustworthy Pre-Trained Neural Network Supply Chain 2022
Loyola University Chicago. Chicago, IL

Challenges in Global Software Development 2021
University of Wisconsin–Stout. Menomonie, WI

Regexes Awry: Characterizing and Defeating Regex-based Denial of Service 2020
Clemson University. Clemson, SC

Regex-based Denial of Service 2020
Clarkson University. Potsdam, NY

Improving Software Security Through Empiricism: A DoS Case Study in Regex 2020
Colorado School of Mines. Golden, CO

Improving Software Security Through Empiricism: A DoS Case Study in Regex 2020
Pennsylvania State University. State College, PA

Improving Software Security Through Empiricism: A DoS Case Study in Regex 2020
University of Nebraska. Lincoln, NE

Improving Software Security Through Empiricism: A DoS Case Study in Regex 2019
York University. Toronto, Canada

Regexes are Hard: Qualitative and Quantitative Perspectives 2019
North Carolina State University. Raleigh, NC

The Dangers of Copy/Pasting Code 2019
Episode of the Podcast "The Secure Developer": https://tinyurl.com/DavisResearchPodcast

Regexes in the Wild 2019
Virginia Tech. Blacksburg, VA

Academic Perspectives on Node.js 2018
Node.js Collaborator Summit. Vancouver, Canada

International Engineering Annual, 2015–2019
Rising Sophomore Abroad Program, Virginia Tech. Blacksburg, VA

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[3]Joint presentation by me (virtual) and my student Purvish Jajal (physical).

ACADEMIC SERVICE

REVIEWER: MAJOR CONFERENCE TECHNICAL TRACKS

PC Member, ICSE	2025
PC Member, ISSTA	2025
PC Member, FSE	2025
PC Member, IEEE SecDev	2024
PC Member, ISSTA	2024
PC Member, ASE	2024
PC Member, ESEC/FSE	2023
PC Member, LCTES	2023
PC Member, ASE	2021
Sub-reviewer: Middleware'17, ASPLOS'18, EuroSys'18, MASCOTS'18, HPCA'19, CGO'19	2016–2019

REVIEWER: JOURNALS

Reviewer, Journal of Systems and Software (JSS)	2024–present
Reviewer, Journal of Online Trust & Safety (JOTS)	2023
Reviewer, ACM Transactions on Software Engineering (TSE)	2020–present
Reviewer, Springer Empirical Software Engineering (EMSE)	2020–present

REVIEWER: OTHER SERVICE AS REFEREE (MINOR VENUES OR TRACKS)

PC Member, Twelfth Workshop on Education for High-Performance Computing (EduHPC)	2024
PC Member, European Workshop on Systems Security (EuroSec)	2024
Reviewer, IEEE-CS SWEBOK Guide V4 (Guide to the Software Engineering Body of Knowledge)	2024
Reviewer, SANER–Early Research Achievement Track	2024
Reviewer, SCAM–Engineering track	2023
Judge, CSAW'23 Best Paper Competition	2023
PC Member, ACM Workshop on Software Supply Chain Offens. Research and Ecosystem Defenses	2023
Reviewer, ASE–Doctoral Symposium Track	2022
PC Member, ACM Workshop on Software Supply Chain Offens. Research and Ecosystem Defenses	2022
Reviewer, ICSE–Demonstrations Track	2021
Reviewer, ESEC/FSE–Artifact Track	2021
Reviewer, ESEC/FSE–Artifact Track	2020
Judge, CSAW'21 Best Paper Competition	2021
Reviewer, CGO–Artifact Track	2019

ORGANIZATIONAL SERVICE

Co-Organizer, ICSE 2025 Student Mentoring Workshop (ICSE-SMeW)	2024-2025
Panelist and Mentor, ICSE student mentor program	2024
Mentor, ICSE student mentor program	2023

NATIONAL SERVICE

US National Science Foundation, Panelist, CISE:CCF:SHF–Software   2023

DEPARTMENTAL SERVICE

Organizer, Software Systems Reading Group   2024

Member, Committee to Create MSc-Software Engineering   2024

Member, Purdue ECE Faculty Search Committee – Prof. of Practice in Software Engineering   2023-2024

Member, Purdue ECE ABET Committee   2023

Member, Purdue ECE Ad Hoc Faculty Search Committee   2023

Member, Purdue ECE Faculty Search Committee — Software Engineering   2022-2023

Host, Computer Engineering Seminar Series — Dr. Joanna C. S. Santos (Notre Dame) 2022

Host, Purdue Engineering Distinguished Lecture Series (PEDLS) — Dr. Nancy Leveson (MIT)   2022

Member, Purdue ECE Undergraduate Curriculum Committee   2020-2022

Panelist, CS@Virginia Tech Academic Jobs Panel   2021

President, Virginia Tech CS Graduate Student Council   2018–2019

Organizer, Virginia Tech Systems Reading Group   2017–2020

SHORT COURSES AND WORKSHOPS ATTENDED

Generative AI Assistance in Grant Proposal Writing (Purdue University–Internal)   2024

Inclusive Research as a Pathway to Broadening Participation and Instit. Excellence (NSF+ODIB)   2024

Leadership Skills for Engineering and Science Faculty (Leiserson and McVinney)   2024

NSF Grand Challenges in Resilience Workshop, Purdue University   2023

Tools to Foster Students' (Cross-)cultural Sensitivity in Engineering Ethical Decision-Making (ASEE'22,
Clancy & Qiu)   2022

Effective College Teaching (Brent & Felder)   2020

Intercultural Pedagogy Grant Training Program, Purdue CILMAR   2020

PROFESSIONAL MEMBERSHIPS

Senior Member, Institute of Electrical and Electronics Engineers (IEEE)   *Elevated to Senior in 2022*

Member, Association for Computing Machinery (ACM)

Member, American Society for Engineering Education (ASEE)

AWARDS AND RECOGNITION

FOR RESEARCH

ACM Distinguished Paper Award, ESEC/FSE 2020	2020
Second place, Grand Finals of the ACM Graduate Student Research Competition	2020
First place, Graduate Student Research Competition, ESEC/FSE 2019	2019
ACM Distinguished Paper Award, ASE 2019	2019
Microsoft Security Researcher Acknowledgments (Regex DoS)	2018
Pratt Fellowship, Virginia Tech College of Engineering	2017–2019
Davenport Fellowship, Virginia Tech College of Engineering	2019
Graduate Fellow, VT Academy for Global Engineering	2019–2020
IBM Significant Contributor Award (Node.js)	2018
ACM Distinguished Paper Award, ESEC/FSE 2018	2018

FOR TEACHING

Nominated for "HKN Outstanding Faculty Member" (did not win)	2023, 2024
2022 Ruth and Joel Spira Outstanding Teacher Award	2022
Fall 2021: Teaching–Recognized for high student evaluation scores (∼100 faculty in College of Eng.)	2021

FOR SERVICE

Nominated for "Purdue Favorite Faculty Award" (did not win)	2024
ASE 2021 Distinguished PC Member Award	2021
Outstanding Graduate Student Service Award, CS@VT	2020

FOR MENTORING

Outstanding Faculty Mentor — School of Electrical & Computer Engineering	2024
VIP Outstanding Team Mentor Award, Purdue TensorFlow Team	2021