# James C. Davis

*Assistant Professor*
*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 #2343596: 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.*

[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 (FULL PAPERS)[2] *These venues are CORE2023 rank A or A*.*

[C-1] P.C. Amusuo, K.A. Robinson, T. Singla, H. Peng, A. Machiry, S. Torres-Arias, L. Simon, **J.C. Davis**. *$ZTD_{JAVA}$: Mitigating Software Supply Chain Vulnerabilities via Zero-Trust Dependencies.* Proceedings of the 47th International Conference on Software Engineering (ICSE'25). 24% acceptance rate (248/1031). 13 pages.

[C-2] N. Eliopoulos, P. Jajal, **J.C. Davis**, G. Liu, G.K. Thiruvathukal, and Y.H. Lu. *Pruning One More Token is Enough: Leveraging Latency-Workload Non-Linearities for Vision Transformers on the Edge.* Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (2025). RATE% acceptance rate (TOTALS/TOTALS). PAGES pages.

[C-3] P. Jajal, N. Eliopoulos, B. Chou, G.K. Thiruvathukal, **J.C. Davis**, and Y.H. Lu. *Token Turing Machines are Efficient Vision Models.* Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (2025). RATE% acceptance rate (TOTALS/TOTALS). PAGES pages.

[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] D. Anandayuvaraj, M. Campbell, A. Tewari, and **J.C. Davis**. *FAIL: Analyzing Software Failures from the News Using LLMs*. Proceedings of the 38th IEEE/ACM International Conference on Automated Software Engineering (ASE'24). 26% acceptance rate (154/587). 13 pages.

[C-5] P. Jajal, W. Jiang, A. Tewari, E. Kocinare, J. Woo, A. Sarraf, Y.H. Lu, G.K. Thiruvathukal, and **J.C. Davis**. *Interoperability in Deep Learning: A User Survey and Failure Analysis of ONNX Model Converters*. Proceedings of the 33rd ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA'24). 21% acceptance rate (143/694). 13 pages.

[C-6] 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-7] 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-8] 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.

[C-9] 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-10] 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-11] 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-12] 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-13] 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-14] 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-15] 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-16] 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-17] 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-18] 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-19] 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-20] **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-21] 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-22] 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-23] **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-24] 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-25] **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-26] 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-27] 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-28] **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-29] **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-30] **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] 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*. Empirical Software Engineering, 2024 (EMSE'24). 63 pages.

[J-2] 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-3] A. Goel, C. Tung, N. Eliopoulos, A. Wang, **J.C. Davis**, G.K. Thiruvathukal, Y.H. Lu. *Tree-based Unidirectional Neural Networks for Low-Power Computer Vision*. IEEE Design & Test, 2022 (IEEE D&T'22). 6 pages.

[J-4] 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-5] 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-6] 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-7] 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). Unknown% acceptance rate (12 papers presented). 31 pages. ***Best Paper Award, Software Engineering Division (given to 1 out of 12 papers)***.

[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). Unknown% acceptance rate (12 papers presented). 27 pages.

[W-3] **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.

[W-4] 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-5] 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-6] 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-7] 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-8] 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-9] 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-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] 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-13] 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-14] 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-15] 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-16] 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-17] **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-18] 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-19] 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-20] **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-21] **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-22] 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-23] **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* (2nd edition, pp. 439–442). CRC Press.

## TECHNICAL REPORTS

[R-1] P.C. Amusuo, P.V. Patil, O. Cochell,T. Le Lievre, and **J.C. Davis**. *A Unit Proofing Framework for Code-level Verification: A Research Agenda*. `https://arxiv.org/pdf/2410.14818`. 2024.

[R-2] H. Peng, A. Gupte, N. Eliopoulos, C. Ho, R. Mantri, L. Deng, W. Jiang, Y.H. Lu, K. Läufer, G.K. Thiruvathukal, and **J.C. Davis**. *Large Language Models for Energy-Efficient Code: Emerging Results and Future Directions*. `https://arxiv.org/abs/2410.09241`. 2024.

[R-3] T. Schorlemmer, E. Burmane, K. Kalu, S. Torres-Arias, and **J.C. Davis**. *Establishing Provenance Before Coding: Traditional and Next-Gen Signing*. `https://arxiv.org/abs/2407.03949`. 2024.

[R-4] B.S.H. Chou, P. Jajal, N.J. Eliopoulos, T. Nadolsky, C.Y. Yang, N. Ravi, **J.C. Davis**, K.Y.J. Yun, and Y.H. Lu. *A Musician's Muse: Detecting Performance Errors with Transformers*. . 2024.

[R-5] M.H.M. Bhuiyan, B. Cakar, E. Burmane, **J.C. Davis**, and C.A. Staicu. *SoK: A Literature and Engineering Review of Regular Expression Denial of Service*. `https://arxiv.org/abs/2406.11618`. 2024.

[R-6] K. Kalu, T. Singla, C. Okafor, S. Torres-Arias, and **J.C. Davis**. *An Industry Interview Study of Software Signing for Supply Chain Security*. `https://arxiv.org/abs/2406.08198`. 2024.

[R-7] 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-8] 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-9] G. Cramer, W. Maxam, Q. Li, and **J.C. Davis**. *An Exploratory Empirical Study of Trust & Safety Engineering in Open-Source Social Media Platforms*. `https://davisjam.github.io//files/publications/CramerMaxamLiDavis-TrustAndSafetyEngineeringInSMPs.pdf`. 2023.

[R-10] 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-11] 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, Fall 2024
*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 |
| Daniel Lugo | PhD | Fall 2024–present |
| Andrew Rozema | PhD | Fall 2024–present |
| | | |
| Parth V. Patil | MSc | Spring 2024–present |
| Sofia Okorafor, US Navy | MSc | Fall 2024–present |
| Charles M. Sale | 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

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

*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*

## ACADEMIC SERVICE

### REVIEWER: MAJOR CONFERENCE TECHNICAL TRACKS

PC Member, ICSE 2025

PC Member, USENIX Security 2025

PC Member, ESEC/FSE 2023, 2025

PC Member, ASE 2021, 2024

PC Member, ISSTA 2024, 2025

PC Member, IEEE SecDev 2024

PC Member, LCTES 2023

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 NON-TECHNICAL 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

PC Member, ACM Workshop on Software Supply Chain Offens. Res. and Ecosystem Def. 2022, 2023

Reviewer, ASE–Doctoral Symposium Track 2022

Reviewer, ICSE–Demonstrations Track 2021

Reviewer, ESEC/FSE–Artifact Track 2020, 2021

Judge, CSAW'21 Best Paper Competition 2021, 2023

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

| | |
|---|---|
| Lead for BSc.-Computer Engineering, Purdue ECE ABET Committee 5-year self-evaluation | 2024-2025 |
| Organizer, Junior Faculty Peer Mentoring Teatime | 2024 |
| Breakout session discussion lead: LLMs in education — ECE ADVANCE | 2024 |
| Organizer, CAREER writing group | 2024 |
| 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

| | |
|---|---|
| Best Paper Award, Software Engineering Division, ASEE 2024 (educational research) | 2024 |
| 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 |
| 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 |
| Microsoft Security Researcher Acknowledgments (Regex DoS) | 2018 |
| 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 |
| One of the "Outstanding Engineering Teachers" (COE) *(based on course evaluation scores)* | 2021, 2024 |

### 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 |