# James C. Davis

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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

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|---|---|
| **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

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|---|---|
| **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: $2,080,714. TOTAL AS PI: $633,237. MY TOTAL SHARE: $1,171,222.**[1]

[G-1] **Unrestricted Gift: Improving OSS Supply Chain Security by Promoting Software Signing**

Co-PI (PI: Santiago Torres-Arias)

*Google, LLC*

*2023. $200,000.*

[G-2] **Rolls Royce: Dynamic Security Analysis of Embedded Software Systems**

Co-PI (PI: Aravind Machiry)

*Contract with Rolls Royce*

*2023-2024. $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] Efficient Computer Vision for Edge Devices**

Co-PI (PI: Yung-Hsiang Lu)

*Contract with Cisco*

*2023-2024. $179,941*

**[G-4] Unrestricted Gift: Machine Learning Reproducibility**

PI

*Google, LLC*

*2022. $80,000.*

**[G-5] 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-6] Cisco: Trustworthy Re-use of Pre-Trained Neural Networks**

PI (Co-PI: Yung-Hsiang Lu)

*Contract with Cisco*

*2022–2023. $179,237.*

**[G-7] 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-8] 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-9] Rolls Royce: Dynamic Analysis of Embedded Firmware**

Co-PI (PI: Aravind Machiry)

*Contract with Rolls Royce*

*2021-2022. $175,000.*

**[G-10] 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-11] 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] 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). 17.8% acceptance rate (261/1463). 16 pages.

[C-2] 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-3] 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-4] 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.

[C-5] 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.

[C-6] 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.

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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-7] 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-8] 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-9] **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-10] 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-11] 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-12] 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-13] 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-14] 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-15] **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-16] 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-17] 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-18] **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-19] 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-20] **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-21] 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-22] 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-23] **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-24] **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-25] **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] 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-2] 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-3] 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'231). 48% acceptance rate (13/27). 5 pages.

[W-4] 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-5] 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-6] 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-7] 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-8] 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-9] 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-10] 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-11] 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-12] N. Synovic, M. Hyatt, R. Sethi, S. Thota, Shilpika, A.J. Miller, W. Jiang, E.S. Amobi, A. Pinder-ski, 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-13] 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-14] **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-15] 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-16] J.M. Winkler, A. Agarwal, C. Tung, D.R. Ugalde, Y.J. Jung, and **J.C. Davis**. *A Replication of "Deep-Bugs: 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-17] **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-18] **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-19] 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-20] **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.

## 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] 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-3] W. Jiang, T.R. Schorlemmer, and **J.C. Davis**. *Trustworthy Re-use of Pre-trained Neural Networks.* 2023 Purdue CERIAS Symposium (**CERIAS'23**).

[Ps-4] W. Maxam and **J.C. Davis**. *Plan for an evaluation of government cyber threat hunting processes.* 2022 Purdue CERIAS Symposium (**CERIAS'22**).

[Ps-5] N. Hornbrook and **J.C. Davis**. *An Intercultural Engineering Module for Software Engineers.* 2021 Annual Colloquium for International Engineering Education (**ACIEE'21**).

[Ps-6] 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**).

## 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.

## 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). <u>Epilogue: The Computer Engineer as Tool-User</u>. In Y.H. Lu & G.K. Thiruvathukal, *Intermediate C Programming* (3rd edition, pp. 439–442). CRC Press.

## 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 |
| | | | |
| Taylor Schorlemmer, US Army | MSc | | Fall 2022–present |
| Jason Jones | MSc | | Summer 2023–present |

### GRADUATED

| | | |
|---|---|---|
| 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*

**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, IN*

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

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

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

**Regex-based Denial of Service** 2020
*Clarkson University, NY*

**Improving Software Security Through Empiricism: A DoS Case Study in Regex** 2020

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

*Colorado School of Mines, CO*

**Improving Software Security Through Empiricism: A DoS Case Study in Regex**  2020
*Pennsylvania State University, 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, 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, VA*

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

**International Engineering**  Annual, 2015–2019
*Rising Sophomore Abroad Program, Virginia Tech*

## ACADEMIC SERVICE AS REFEREEE

### CONFERENCE TECHNICAL TRACKS

PC Member, ICSE  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

### JOURNALS

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

## OTHER SERVICE AS REFEREE

| | |
|---|---|
| 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 |

## NATIONAL SERVICE

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

## DEPARTMENTAL SERVICE

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|---|---|
| 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 |

## OTHER SERVICE

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|---|---|
| Panelist and Mentor, ICSE student mentor program | 2024 |
| Mentor, ICSE student mentor program | 2023 |

## SHORT COURSES AND WORKSHOPS ATTENDED

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|---|---|
| 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

| | |
|---|---|
| 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 |
| VIP Outstanding Team Mentor Award, Purdue TensorFlow Team | 2021 |

### FOR SERVICE

| | |
|---|---|
| ASE 2021 Distinguished PC Member Award | 2021 |
| Outstanding Graduate Student Service Award, CS@VT | 2020 |