Gedare Bloom, Ph.D.

CV: 08/03/20

Computer Science
University of Colorado Colorado Springs
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gbloom@uccs.edu
https://gedare.github.io
https://scholar.google.com/citations?user=8ZBnSl4AAAAJ

Research and Teaching

Embedded Systems, Computer Security, Cyber-Physical Systems, Computer Architecture, Operating Systems, Real-Time Systems.

Education

Ph.D., The George Washington University, Computer Science, 2013

M.S., The George Washington University, Computer Science, 2012

B.S., Michigan Technological University, Computer Science, Mathematical Sciences (double major), 2005

Academic Employment

Assistant Professor, University of Colorado Colorado Springs, August 2019 – Current

Assistant Professor, Howard University, August 2015 – May 2019

Research Scientist, GW, October 2014 – August 2015

Post-doctoral Scientist, GW, January 2013 – September 2014

Grants

Awarded

National Science Foundation
Title: CICI: SSC: Real-Time Operating System and Network Security for Scientific Middleware
Role: PI
Amount: $1,015,915
Period: 10/01/2018-09/30/2021

National Science Foundation
Title: CPS: Breakthrough: Collaborative Research: Track and Fallback: Intrusion Detection to Counteract Carjack Hacks with Fail-Operational Feedback
Role: PI, with Joseph Zambreno (Iowa State)
Amount: $266,551
Period: 10/1/2016-09/30/2021

Department of Homeland Security
Title: Security Engineering for Resilient Networked Critical Infrastructure
Role: PI, with Danda Rawat (co-PI)
Amount: $1,198,627
Period: 8/9/2017-07/31/2022

National Science Foundation

Title: HDR DSC: Collaborative Research: Transforming Data Science Education through a Portable and Sustainable Anthropocentric Data Analytics for Community Enrichment Program
Role: Co-PI, with Jiang Li, Yayin Fang, Shaolei Teng, Jae Eun Chung
Amount: $499,955
Period: 10/01/2019-09/30/2022

Office of Naval Research
Title: LockdownOS: a Component-Based Foundation for System Monitoring, Quarantine, and Recovery
Role: Co-PI, with Gabriel Parmer (PI) and Rahul Simha (co-PI)
Amount: $600,000
Period: 2014-2017

Submitted (unfunded)

Amazon.com, Inc
"Integration of Machine Learning and Pattern Matching Hardware Accelerators in Computer Systems", PI. 2018.

National Science Foundation
"CAREER: Real-Time Provenance and Trusted Execution for IoT Edge Data Integrity", PI. 2018.

National Science Foundation
"CRII: SaTC: Security without Privilege for Hard Real-Time Systems", PI. 2016.

Thurgood Marshall College Fund – Apple
"SUCCESSES: Successes in Undergraduate Collaborations for Computer and Engineering Student Stimulation with Embedded Systems", PI. 2016.

National Science Foundation
"A Hardware-based User-centric Real Time Security and Trust Paradigm for IoT", PI, with Legand Burge. Preliminary proposal. 2016.

Air Force
"FPGA-based Security Enhanced Embedded Systems for the Internet of Things", PI, subcontract. 2016.

National Science Foundation
"Expository and Interdisciplinary Cybersecurity", PI, with Gloria Washington, Jiang Li, Wayne Patterson, Rajni Goel, and Robert Palmer. 2016.

National Science Foundation
"CRII: CPS: Cross-Connecting Safety and Security in Cyber-Physical Systems", PI, 2016.

National Science Foundation
"SHF:Medium:Collaborative Research: Active Data Structures (ADS): Hardware-Software Interfaces for Data Structures and Events", PI, with Gabriel Parmer and Rahul Simha. 2016.

Office of the Secretary of Defense

"Mutable Obfuscating Redundant Processor HAL – MORPH", subcontract from Intelligent Automation, Inc. (Prime Contractor), 2014.

National Science Foundation
"CSR:Medium:Active Data Structures (ADS): Systems Support for Multi-core OS and Service Applications", co-PI with Gabriel Parmer, Rahul Simha, and Guru Venkataramani, 2013.

U.S. Department of State
"StegoBridge: Connecting Users to Popular Websites without Detection", co-PI with Rahul Simha and Nasir Memon (NYU-Poly), 2013.

National Reconnaissance Office
"Real-Time Memory Protection for On-Board Satellite Software", PI with Rahul Simha and On-line Applications Research Corp. (Subcontractor), 2013.

Dissertation

G. Bloom, "Operating System Support for Shared Hardware Data Structures," The George Washington University, Washington, DC. November, 2012. Advised by Bhagirath Narahari and Rahul Simha.

Publications

Note: In computer science, selective conferences with acceptance rates below 30% (such as EMSOFT, RTAS, DSN) are used to disseminate research—see "Evaluating Computer Scientists for Promotion and Tenure" from the Computing Research Association, and "Research Evaluation for Computer Science" in Communications of the ACM (April '09).

* Indicates a student lead author whom I supervised. Undergraduate student names are underlined.

Refereed Journal Papers

1. H. Olufowobi, C. Young, J. Zambreno, **G. Bloom**, "SAIDuCANT: Specification-based Automotive Intrusion Detection using Controller Area Network (CAN) Timing," accepted to appear in IEEE Transactions on Vehicular Technology, 2019.

2. *C. Young, J. Zambreno, H. Olufowobi, and **G. Bloom**, "Survey of Automotive Controller Area Network Intrusion Detection Systems," in IEEE Design & Test, vol. 36, no. 6, pp 48-55, Dec. 2019.

3. *U. K. Agarwal, V. P. Ashokbai, **G. Bloom**, C. Mauderer, and J. Sherrill, "Comparison of File Systems in RTEMS," SIGBED Rev., vol. 16, no. 3, pp. 39–44, Oct. 2019.

4. **G. Bloom**, G. Cena, I. Cibrario Bertolotti, T. Hu, A. Valenzano, "Event Notification in CAN-based Sensor Networks," in IEEE Transactions on Industrial Informatics, vol. 15, no. 10, pp 5613-5625, Oct. 2019.

5. **G. Bloom**, J. Sherrill, and G. Gilliland, "Aligning Deos and RTEMS with the FACE Safety Base Operating System Profile," SIGBED Rev., vol. 15, no. 1, pp. 15–21, Mar. 2018.

6. **G. Bloom** and J. Sherrill, "Scheduling and Thread Management with RTEMS", ACM SIGBED Review, vol. 11, no. 1, pp. 20-25, February 2014.

7. E. Leontie, **G. Bloom**, O. Gelbart, B. Narahari, and R. Simha. "A compiler-hardware technique for protecting against buffer overflow attacks," Journal of Information Assurance and Security, vol. 5, no.1, pp. 1-8, 2010.

8. **G. Bloom**, B. Narahari, R. Simha, and J. Zambreno. "Providing secure execution environments with a last line of defense against Trojan circuit attacks," Computers & Security, vol. 28, no. 7, pp. 660-669, October 2009.

Peer-Reviewed Conference Papers

1. **G. Bloom** and J. Sherrill, "Harmonizing ARINC 653 and Realtime POSIX for Conformance to the FACE Technical Standard," in 2020 IEEE 23rd International Symposium on Real-Time Distributed Computing (ISORC), pp. 98-105, May 2020.

2. M. Nasri, T. Chantem, **G. Bloom**, and R. Gerdes, "On the Pitfalls and Vulnerabilities of Schedule Randomization against Schedule-Based Attacks," 25th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS'19), April 2019.

3. **G. Bloom**, G. Cena, I. Cibrario Bertolotti, T. Hu, and A. Valenzano, "Supporting Security Protocols on CAN-Based Networks", 18th Annual IEEE International Conference on Industrial Technology (IEEE ICIT '17), March 2017.

4. S. Gadia, C. Artho, and **G. Bloom**, "Verifying Nested Lock Priority Inheritance in RTEMS with Java Pathfinder", In: Ogata K., Lawford M., Liu S. (eds) Formal Engineering Methods. ICFEM '16. Lecture Notes in Computer Science, vol 10009. Springer, Cham.

5. *Y. Ren, G. Parmer, T. Georgiev, and **G. Bloom**, "CBufs: Efficient, System-wide Memory Management and Sharing", 2016 ACM SIGPLAN International Symposium on Memory Management (ISMM'16), June 2016.

6. *J. Song, **G. Bloom**, and G. Parmer. "SuperGlue: IDL-Based, System-Level Fault Tolerance for Embedded Systems", 46th IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2016), June 2016.

7. D. Cederman, D. Hellström, J. Sherrill, **G. Bloom**, M. Patte, and M. Zulianello. "RTEMS SMP and MTAPI for Efficient Multi-Core Space Applications on LEON3/LEON4 Processors", Data Systems In Aerospace, DASIA, May 2015.

8. **G. Bloom** and R. Simha, "Hardware-Enhanced Distributed Access Enforcement for Role-Based Access Control", 19th ACM Symposium on Access Control Models and Technologies, SACMAT, June 2014.

9. D. Cederman, D. Hellström, J. Sherrill, **G. Bloom**, M. Patte, and M. Zulianello. "RTEMS SMP for LEON3/LEON4 Multi-Processor Devices", Data Systems In Aerospace, DASIA, June 2014.

10. **G. Bloom**, G. Parmer, B. Narahari, and R. Simha, "Shared Hardware Data Structures for Hard Real-Time Systems," 12th International Conference on Embedded Software. EMSOFT. October 2012.

11. E. Leontie, **G. Bloom**, B. Narahari, and R. Simha, "No Principal Too Small: Memory Access Control for Fine-Grained Protection Domains," 15th Euromicro Conference on Digital System Design. DSD. September 2012.

12. **G. Bloom**, B. Narahari, and R. Simha. "Fab Forensics: Increasing Trust in IC Fabrication," IEEE International Conference on Technologies for Homeland Security. HST. November 2010.

13. E. Leontie, **G. Bloom**, B. Narahari, R. Simha, and J. Zambreno. "Hardware Containers for Software Components: A Trusted Platform for COTS-Based Systems," 2009 IEEE/IFIP International Symposium on Trusted Computing and Communications. TRUSTCOM. August 2009.

14. **G. Bloom** and S. Popoveniuc, "Information leakage in mix networks with randomized partial checking," 2009 International Conference on Information Security and Privacy. ISP-09. July 2009.

Peer-Reviewed Workshop and Short Papers

1. *P. Dangal and **G. Bloom**, "Towards Industrial Security Through Real-time Analytics," in 2020 IEEE 23rd International Symposium on Real-Time Distributed Computing (ISORC), pp. 156-157, May 2020.

2. H. Olufowobi, S. Hounsinou, and **G. Bloom**, " Controller Area Network Intrusion Prevention System Leveraging Fault Recovery," ACM Workshop on Cyber-Physical Systems Security & Privacy (CPS-SPC), London, UK, November 2019.

3. *H. Olufowobi, U. Ezeobi, E. Muhati, G. Robinson, C. Young, J. Zambreno, and **G. Bloom**, "Anomaly Detection Approach Using Adaptive Cumulative Sum Algorithm for Controller Area Network," ACM Workshop on Automotive Cybersecurity (AutoSec), Dallas, TX, March 2019.

4. *C. Young, H. Olufowobi, **G. Bloom**, and J. Zambreno, "Automotive Intrusion Detection Based on Constant CAN Message Frequencies Across Vehicle Driving Modes," ACM Workshop on Automotive Cybersecurity (AutoSec), Dallas, TX, March 2019.

5. *H. Olufowobi, **G. Bloom**, C. Young, and J. Zambreno, "Work-in-Progress: Real-Time Modeling for Intrusion Detection in Automotive Controller Area Network," 2018 IEEE Real-Time Systems Symposium (RTSS), Nashville, TN, December 2018.

6. *U. K. Agarwal, V. P. Ashokbai, **G. Bloom**, C. Mauderer, and J. Sherrill, "Comparison of File Systems in RTEMS," 2018 Embedded Operating Systems Workshop (EWiLi 2018), Turin, Italy, October 2018.

7. **G. Bloom**, B. Alsulami, E. Nwafor, and I. C. Bertolotti, "Design Patterns for the Industrial Internet of Things," 14th IEEE International Workshop on Factory Communication Systems (WFCS), Imperia, Italy, June 2018.

8. *E. Nwafor, A. Campbell, and **G. Bloom**, "Anomaly-based Intrusion Detection of IoT Device Sensor Data using Provenance Graphs," 1st International Workshop on Security and Privacy for the Internet-of-Things

(IoTSec), Orlando, April 2018.

9. *E. Nwafor, A. Campbell, D. Hill, and **G. Bloom**, “Towards a Provenance Collection Framework for Internet of Things Devices,” 14th IEEE International Conference on Ubiquitous Intelligence and Computing (UIC), San Francisco, August 2017.

10. **G. Bloom**, G. Cena, I. C. Bertolotti, T. Hu and A. Valenzano, "Optimized event notification in CAN through in-frame replies and Bloom filters," 2017 IEEE 13th International Workshop on Factory Communication Systems (WFCS), Trondheim, June 2017.

11. C. Tessler, **G. Bloom**, and N. Fisher, “Work-In-Progress: Reducing Cache Conflicts via Interrupts and BUNDLE Scheduling,” 2017 IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS '17), April 2017.

12. C. Young, J. Zambreno, and **G. Bloom**, “Towards a Fail-Operational Intrusion Detection System for In-Vehicle Networks,” 1st Workshop on Security and Dependability of Critical Embedded Real-Time Systems (CERTS '16), November 2016.

13. **G. Bloom**, J. Sherrill, G. Gilliland, “Aligning Deos and RTEMS with the FACE Safety Base Operating System Profile,” 6th Embedded Operating System Workshop (EWiLi'16), October 2016.

14. *J. Marshall, **G. Bloom**, G. Parmer, and R. Simha. “n-Modular Redundant Real-Time Middleware: Design and Implementation,” 6th Embedded Operating System Workshop (EWiLi'16), October 2016.

15. **G. Bloom**, G. Parmer, and R. Simha. “LockDown: an operating system for achieving service continuity by quarantining principals”, 9th European Workshop on System Security (EuroSec '16), April 2016.

16. *H. Felbinger, J. Sherrill, **G. Bloom**, and F. Wotawa, “Test Suite Coverage Measurement and Reporting for Testing an Operating System without Instrumentation”, 17th Real-Time Linux Workshop, RTLWS17, October 2015.

17. **G. Bloom**, B. Narahari, R. Simha, A. Namazi, and R. Levy, “FPGA SoC Architecture and Runtime to Prevent Hardware Trojans from Leaking Secrets”, IEEE International Symposium on Hardware-Oriented Security and Trust, HOST 2015, May 2015.

18. *E. Armbrust, J. Song, **G. Bloom**, and G. Parmer, “On Spatial Isolation for Mixed Criticality, Embedded Systems”, 2nd International Workshop on Mixed Criticality Systems, WMC, December 2014.

19. E. Leontie, **G. Bloom**, R. Simha, “Hardware and Software Support for Fine-Grained Memory Access Control and Encapsulation in C++,” ACM SIGPLAN Systems, Programming, Languages and Applications: Software for Humanity, SPLASH, October 2013.

20. *S. Smith, **G. Bloom**, R. Simha, “PyLOM: A Language and Run-Time

System for Planning Applications," ACM SIGPLAN Systems, Programming, Languages and Applications: Software for Humanity, SPLASH, October 2013.

21. E. Leontie, **G. Bloom**, R. Simha, "Automation for Creating and Configuring Security Manifests for Hardware Containers," 4th Symposium on Configuration Analytics and Automation. SafeConfig. October 2011.

22. **G. Bloom**, G. Parmer, B. Narahari, and R. Simha. "Real-Time Scheduling with Hardware Data Structures," Work in Progress, IEEE Real-Time Systems Symposium, 2010. RTSS. December 2010.

23. E. Leontie, **G. Bloom**, B. Narahari, R. Simha, and J. Zambreno. "Hardware-enforced Fine-grained Isolation of Untrusted Code," Proceedings of the First ACM Workshop on Secure Execution of Untrusted Code. SecuCode. November 2009.

24. **G. Bloom**, B. Narahari, and R.Simha. "OS Support for Detecting Trojan Circuit Attacks," 2nd IEEE International Workshop on Hardware-Oriented Security and Trust. HOST, July 2009.

Book Chapters

1. *H. Olufowobi and **G. Bloom**, "Chapter 16 - Connected Cars: Automotive Cybersecurity and Privacy for Smart Cities," Smart Cities Cybersecurity and Privacy, Elsevier, 2019, pp 227-240.
2. **G. Bloom**, J. Sherrill, S. Huber, and C. Johns, "Structure of the RTEMS Real-Time Operating System", to appear in *Handbook on Electrical Engineering Technology and Systems*, CRC Press, Taylor & Francis, to appear.
3. **G. Bloom**, E. Leontie, B. Narahari, and R. Simha, "Chapter 12 - Hardware and Security: Vulnerabilities and Solutions," in *Handbook on Securing Cyber-Physical Critical Infrastructure*, Boston: Morgan Kaufmann, 2012, pp. 305–331. ISBN: 978-0-12-415815-3.

Non-Refereed Publications

S. Mohan, M. Asplund, **G. Bloom**, A. Sadeghi, A. Ibrahim, N. Salajageh, P. Griffioen, and B. Sinopoli, "Special Session: The Future of IoT Security", ESWEEK 2018, October 2018.

G. Bloom and J. Sherrill, "Scheduling and Thread Management with RTEMS" (Invited Paper), 3rd Embedded Operating Systems Workshop, EWiLi, August 2013.

University Teaching

University of Colorado Colorado Springs

Assistant Professor

Course	Semester	Students	Mean Instructor Rating
Computer Architecture (UG)	Fall '19	55	3.6 / 7.0 (85% responses)
Computer Architecture (G)	Fall '20	9	3.7 / 7.0 (75% responses)

Howard University **Assistant Professor**

Course	Semester	Students	Mean Instructor Rating
Real-Time Systems	Spring ‘19	25	4.2 / 5.0 (36% responses)
Computer Organization II	Spring ‘19	75	3.6 / 5.0 (16% responses)
Applied Data Science	Fall ‘18	45	T.B.D.
Operating Systems	Fall ‘18	22	T.B.D.
Computer Organization I	Spring ‘18	27	T.B.D.
Computer Organization II	Spring ‘18	44	T.B.D.
CS Undergraduate Research	Spring ‘18	2	Insufficient Sample Size
Operating Systems	Fall ‘17	64	T.B.D.
Computer Architecture	Fall ‘17	14	Unknown
Computer Organization II	Spring '17	50	4.1 / 5.0 (87% responses)
Advanced Operating Systems	Spring '17	10	Unknown
CS Undergraduate Research	Spring '17	2	Insufficient Sample Size
Computer Organization I	Fall '16	60	4.1 / 5.0 (20% responses)
Operating Systems	Fall '16	40	4.3 / 5.0 (13% responses)
Computer Organization II	Spring '16	52	4.1 / 5.0 (19% responses)
Advanced Operating Systems	Spring '16	1	Insufficient Sample Size
CS Undergraduate Research	Spring '16	3	Insufficient Sample Size
Computer Organization I	Fall '15	49	Unknown

- Developed new course CSCI/EECE 484 Real-Time Systems, 2019.
- Developed new course CSCI 473 Applied Data Science, 2018-2019.
- Developed an award-winning CSCI 201 and CSCI 202 sequence focusing on team-based projects and emphasizing soft skills development, 2015-2016.
- Re-developed CSCI 401 to focus on team-based projects, 2016.

- Re-developed CSCI 680 to cover multiple real-world operating systems, 2016.

George Washington University

Teaching Assistant

Course	Semester	Students	Mean Instructor Rating
Computer Security	Fall '11	33	N/A
Intro to Operating Systems	Fall '08	32	4.2 / 5.0 (66% responses)
Computer Architecture 2	Spring '08	14	4.2 / 5.0 (26% responses)
Intro to Operating Systems	Fall '07	19	3.0 / 5.0 (36% responses)
Software Engineering 1	Spring '07	9	4.83 / 5.0 (74% responses)
Software Engineering 1	Fall '06	16	3.63 / 5.0 (50% responses)

Computer Security (Fall '11). Advised student teams and conducted security code reviews for team-based term projects with both undergraduate and graduate students. Graded.

Intro. to Operating Systems (Fall '08, Fall '07). Developed and delivered lectures and interactive labs studying and modifying the Linux kernel for CS and Computer Engineering undergraduates. Devised new homework assignments, quizzes, lectures, and active learning modules writing system calls and kernel modules. Formed student teams, supervised and evaluated team projects. Graded.

Computer Architecture 2 Lab (Spring '08). Developed and delivered weekly recitation lectures with active learning modules (C and Verilog) for CS and Computer Engineering undergraduates. Graded.

Software Engineering 1 Lab (Spring '07, Fall '06). Clarified course materials and delivered impromptu at-the-board lectures for diverse majors. Graded.

Grader

Algorithms and Data Structures I, Spring '11.

Michigan Technological University

Grader

C++ as a Second Language, Fall '04.

Mentoring and Supervising

University of

Postdoctoral Scholars

Colorado Colorado Springs

Sena Hounsinou, Real-Time Operating System and Network Security for Scientific Middleware, 2020-

Ph.D. Student Advisees

Prajjwal Dangal, *TBD (IoT/CPS Security)*, Ph.D. Student

Uchenna Ezeobi, *TBD (IoT Security)*, Ph.D. Student

Douglas Healy, *TBD (Cybersecurity)*, Ph.D. Student

Farhad Mofidi*, TBD (Cybersecurity)*, Ph.D. Student

Timothy Montgomery, *TBD (Cybersecurity)*, Ph.D. Student

Abiola Ogundeko, *TBD (IoT/CPS Security)*, Ph.D. Student

Ijeoma Olawale, *TBD (Cybersecurity)*, Ph.D. Student

Chun-Hao James Peng, *TBD (ML Security)*, Ph.D. Student

Katrina Rosemond, *TBD (Cybersecurity)*, Ph.D. Student

Mark Stidd, *TBD (IoT/CPS Security)*, Ph.D. Student

M.S. Student Advisees

Justis Hsieh, *TBD (Cybersecurity)*, M.S. Student

Andrew Nielsen, *TBD (Cybersecurity)*, M.S. Student

Mark Pizzolatto, *TBD (Space Security)*, M.S. Student

Graduate Committees

Committee Member, Khalid Abahussain, MS Thesis, Fall 2019.

Howard University

Graduate Students

Ebelechukwu Nwafor, Ph.D. *Trace-Based Data Provenance for Cyber-Physical Systems*, Defended 04/20/2018, Graduated 05/2018.

Habeeb Olufowobi, Ph.D. *Fail-Operational Intrusion Detection Systems (FO-IDS): A Mechanism for Securing Automotive In-Vehicle Networks*, Graduated 05/2019.

Co-Supervised with Dr. Gloria Washington:

Katrina Rosemond, *TBD (Cybersecurity)*, M.S. Student

Undergraduate Student Researchers

Keenah Mays, *Block Programming for the IoT*, B.S. ‘19 (est.)

Andriana Burgess, *Block Programming for the IoT*, B.S. ‘19 (est.)

Cynthia Jules, *Block Programming for the IoT*, B.S. ‘19 (est.)

Gaylon Robinson, *Medical Robot Assistant*, B.S. '19 (est.)

India Burse, *Medical Robot Assistant*, B.S. '19 (est.)

David Hill, *IoT-in-a-Rack*, B.S. '19 (est.)

Andre Campbell, *Tracing Provenance for IoT*, B.S. '19 (est.)

Pratyush Thapa, *Automotive Security*, B.S. '19 (est.)

Saurav Aryal, *Automotive Security*, B.S. '18 (est.)

Spencer Goodwin, *IoT-in-a-Rack*, B.S. ‘18 (est.)

Samman Thapa, *Architectural Support for RTOS*, B.S. '18 (est.)

Dwight Thomas, *Offensive Cybersecurity Tools for IoT*, B.S. '18 (est.)

Elise Blackmon, *Cybersecurity for Satellite Middleware*, B.S. EE '17

Portia Herndon, *Cybersecurity for Satellite Middleware*, B.S. CS '17

George Washington University

Co-supervised with Gabriel Parmer:

Yuxin Ren, *TBD (Memory Management)*, Ph.D. Student.

Teo Georgiev, *System Security*, M.S. 2017. (est.)

Eric Armbrust, *Dynamic TCB in a component-based OS*, B.S. '17 (est.)

Jiguo Song, *System Support for Predictable, Efficient Fault Recovery*, Ph.D. '16.

Co-supervised with Rahul Simha:

James Marshall, *Software-Based nMR for Cyber-Physical Systems*, Ph.D. candidate.

Pablo Frank Bolton, *Interactive Prototyping of Complex Objects for Robotic Tasks*, Ph.D. candidate.

Jennifer Hill, *CAPITAL Passages,* part of the *CAPITAL: Comprehension and Pronunciation Instructional Tools for Adult Learners* project, Ph.D. candidate.

Christopher Scotty Smith, *Language Development for Robotic Planning Applications*, M.S. May '13, now Visiting Instructor at Roanoke College.

James Pizzurro, *CAPITAL Words,* part of the *CAPITAL: Comprehension*

and Pronunciation Instructional Tools for Adult Learners project, B.S. '14.

Google Code-In *(High School Students)*

Guided high school students through software development projects that I designed as month-long efforts sub-divided into one to three day sprints.

Ethan Ordentlich, *Getting Started on MS Windows*, '15, Winner.

Aun-Ali Zaidi, *Investigate/ Fix Bug Tickets,* '15, Winner.

Daniel Ramirez, *Port Rhealstone to RTEMS*, '13, Winner.

Chirayu Desai, *Replace Make with Waf*, '13, Winner.

Bryan Dunsmore, *Replace Make with Waf*, '13, Reserve Winner.

Radu Toma, *Video Tutorial:Getting Start with RTEMS Using a Virtual Machine*, '13.

Google Summer of Code

Mentored college students during summer-long software development cycles.

Utkarsh Rai, *Memory Protection*, '20

Richi Dubey, *Improve the SMP scheduler with arbitrary processor affinity support*, '20

Ravindra Kumar Meena, *Basic Support for Trace Compass*, '19

Vidushi Vashishth, *Enhancement of RTEMS runtime tracing*, '18

Spencer Goodwin, *CTF Integration*, '17

Nikolay Komashinskiy, *Tying reliable hardware, reliable software and environment: RTEMS BSP development for TMS570 processors*, '17

Habeeb Olufowobi, *Porting RTEMS to ARM Cortex M4F*, '16

Sambeet Panigrahi, *Porting ROCK on RTEMS*, '16

Rohini Kulkarni, *Raspberry Pi 2 Support*, '15.

Přemysl Houdek, *RTEMS port to Cortex – R4f*, '14.

Hesham Moustafa Almatary, *Porting RTEMS to OpenRISC*, '14. *Enhance low-level API of libmm (Memory Protection & Caches), '*13. *RTEMS MMU/ MPU support for ARM architecture, '*12.

Sree Harsha Konduri, *Global EDF Scheduler*, '13.

Petr Benes, *Porting of resource reservation framework to RTEMS, '*11.

European Space Agency Summer of Code in Space

Mentored college students during summer-long software development.

Mikail Yayla, *Software-based Fault Tolerance*, '17.

Hermann Felbinger, *Improve Code Coverage Analysis Meeting Aviation and Automotive Standards*, '15.

Saeed Ehteshamifar, RTEMS Fault tolerance: *Get a fault injection tool to work with RTEMS*, '15.

Honors and Awards

Daniels Fund Ethics Initiative Collegiate Program at UCCS College of Business Ethics Fellow (Ethics Fellow), University of Colorado Colorado Springs, ‘20.

Most Valuable Professor, Howard University Department of Computer Science, '16.

Summer Dissertation Fellowship, $2000, George Washington University, '12

SAFECONFIG Student Travel Award, $415, UNC Charlotte, '11.

CS Department Student Travel Award, $1000, George Washington University, '10, awarded to travel to RTSS.

CCS Travel Grant Award, $405, ACM Conference on Computer and Communications Security, '09.

SecuCode Travel Grant Award, $560, ACM workshop on Secure execution of untrusted code, '09.

Honorable Mention, Philip Amsterdam Graduate Teaching Assistant Awards for Outstanding Teaching, George Washington University, 2008-2009. Awarded for excellence in teaching, 3 winners and 2 honorable mentions were chosen university-wide.

CS Department Student Travel Award, $1000, George Washington University, '09, awarded to travel to HOST.

George B. Robbe Scholarship, $300, Michigan Technological University, Fall '04, awarded for academic excellence.

Service

National Panelist Reviewer

NSF: '15, '16, '17, ‘18, ‘19, ‘20.

ASEE/SMART: '16.

NDSEG: ‘19.

Conference and Workshop Organization

Organizer and Program Chair, The Embedded Operating Systems Workshop (EWiLi),’19.

Organizer and Program Chair, 2nd International Workshop on Security and Privacy for the Internet-of-Things (IoTSec), ‘19.

Conference Technical Program Committees

Program Committee Member, IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), '17, ‘19

Program Committee Member, IEEE Real-Time Systems Symposium (RTSS), ‘18

Program Committee Member, IEEE Conference on Dependable and Security Computing (DSC), ‘18.

Artifact Evaluation Committee Member, IEEE Real-Time Systems Symposium (RTSS), '16, ‘19

Program Committee Member, Euromicro Conference on Digital System Design (DSD) Special Session on Mixed-Criticality System Design, Implementation and Analysis (MCSDIA), '14, '15, '16, '17, ‘18

Workshop Program Committees

Program Committee Member, The Joint Workshop on CPS & IoT Security and Privacy, ‘20.

Program Committee Member, IEEE Workshop on the Internet of Safe Things (SafeThings), ‘19, ‘20.

Program Committee Member, ACM Workshop on Automotive Cybersecurity (AutoSec), ‘19, ‘20.

Program Committee Member, 14th IEEE International Workshop on Factory Communication Systems (WFCS), ‘18

Program Committee Member, 1st IEEE Workshop on 5G Wireless Security (5G-Security), ‘18

Program Committee Member, 1st International Workshop on Security and Privacy for the Internet-of-Things (IoTSec), '18

Program Committee Member, The Embedded Operating Systems Workshop (EWiLi), '14, '15, '16, '17, ‘18

Reviewer

Journals Refereed

Real-Time Systems Journal, ‘19, ‘20

IEEE Internet of Things Journal, ‘18, ‘19, ‘20

IEEE Transactions on Industrial Informatics, '16, ‘18, ‘20

IEEE Systems Journal, ‘20

IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, ‘18, ‘19

IEEE Transactions on Services Computing, ‘18.

IEEE Transactions on Very Large Scale Integration Systems, ‘18.

IEEE Transactions on Parallel and Distributed Systems, ‘18

Elsevier Science of Computer Programming: Special Issue on Formal Techniques for Safety-Critical Systems, '15.

IEEE Transactions on Information Forensics and Security (TIFS): Special Issue on Electronic Voting, '09

Conferences and Workshops Reviewed

EWiLi, RTAS, DSD, RTSS, DSC, WFCS, IoTSec, 5G-Security

Conference Volunteer

Session Chair, RTSS ‘18

Session Char, RTAS ‘17

Session Chair, EWiLi '16, ‘18

Track chair and PhD Colloquium co-host, 6th International Conference on Information Warfare and Security (ICIW 2011), '11.

Staff, ACM ASPLOS XIV, '09.

University Service

University of Colorado Colorado Springs

Participant, UCCS Cybersecurity Faculty Luncheon, October 24, 2019.

Howard University

Member, Howard University and Greater Washington Partnership – Northrop Grumman, August 2018 – May 2019.

Faculty Adviser, HU, '15. Cyber Club.

George Washington University

Graduate Adviser, GW, '10-'11. ACM Student Group Executive Board. Advised the E-Board as an ex officio member. Recommended ACM Student Group take responsibility for an unused CS department compute cluster.

Graduate Student Representative, Research and Instructional Technology Committee (RITC)**,** GW '09-'10. Articulated graduate student perspectives for university-wide committee on technology use.

College Service

University of Colorado Colorado Springs
College of Engineering and Applied Science

Member, ME Cybersecurity Online Committee, Spring ‘20

Howard University
College of Engineering, Architecture and Computer Sciences

Member, Ad Hoc Undergraduate Advising Committee, September ‘18

Member, Google-Howard Partnership Initiative, January 2017.

Committee Member, Faculty Search Committee, Civil Engineering Department, October '16 – February '17.

Committee Member, External Communications Task Force, March '16 – April '16.

Member, Industry Outreach Initiative, presented "Building a Strategic Partnership between Texas Instruments and Howard University" delivered to representatives of Texas Instruments, 11/12/2015.

Department Service

University of Colorado Colorado Springs
Department of Computer Science

Committee Member, Gallogly Chair Faculty Search Committee, AY19-20

Committee Member, TT Cybersecurity Faculty Search Committee, AY19-20

Undergraduate Academic Advisor, August '20 – current

Howard University
Department of Computer Science

Committee Member, Undergraduate Student Affairs Committee, September '18 – May '19

Committee Member, Undergraduate Curriculum Committee, January '17 – May '19.

Undergraduate Academic Advisor, October '16 – May '19

Committee Member, Assessment (ABET) Committee, August '16 – May '19

Acting Program Director of Computer Science, August '18.

Coordinating Requests for Equipment and Supplies from Texas Instruments, November 2015 – January 2017.

Secretary, EECS Inauguration Meeting, 08/18/2016.

Industry Partnerships, HU, '15. Met with industry representatives and secured or accepted gift donations.

George Washington University
Department of Computer Science

Interviewer, GW, '08-'14. Attended over 30 job talks, asked questions, led small group discussions between students and faculty candidates, and submitted notes to the search committees.

Interviewer, GW, '13. Reviewed application packets and interviewed 3 students for a funded position in the CS department.

Community Leader, GW, '10. Organized a graduate student group to discuss the Ph.D. program, and submitted minutes and requests to the CS chair.

Department Representative, GW, '10. Discussed the direction of the School of Engineering & Applied Science (SEAS) with members of the SEAS National Advisory Council.

Department Representative, GW, '09. Represented the department at the DC Council of Engineering & Architectural Societies Awards Banquet as a guest of keynote speaker Dr. Dolling, Dean of SEAS at GW.

Department Representative, MTU, '05. Promoted the CS department to high school students who were visiting Michigan Tech.

Professional Development

Workshop and Conference Participant

ISORC 2020, Virtual Conference, May 2020.

EWiLi 2018, The Embedded Operating System Workshop, Turin, Italy, October 2018.

Embedded Systems Week, Turin, Italy, October 2018.

NSF CC*/CICI Principal Investigator Meeting, College Park, MD, September 2018.

Workshop on Modeling, Measuring, and Managing Uncertainty in Cyber-Physical Systems, York University, July 2018.

ISACA Greater Washington DC Annual Meeting, Rosslyn, VA, June 2018.

Workshop on Spacecraft Flight Software, Johns Hopkins University Applied Physics Lab, December 2017.

NSF Cyber-Physical Systems (CPS) Principal Investigator Meeting, Alexandria, VA, November 2017.

IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), Pittsburgh, PA, April 2017.

Computing Community Consortium Symposium on Computing Research Addressing National Priorities and Societal Needs. Washington, DC, May 2016.

CISE CAREER Proposal Writing Workshop, National Science Foundation, Arlington, VA. March 2016.

Exploring Cybersecurity Challenges in Electrified Transportation: A Focused Workshop. Washington, DC, February 2016.

Women of Color in STEM Conference. Detroit, MI, October 2015.

cFE/CFS Tutorial Day, Johns Hopkins University Applied Physics Lab, October, 2015.

Workshop on Spacecraft Flight Software, Johns Hopkins University Applied Physics Lab, October, 2015.

University Faculty Development Participant

Howard University

Howard University Customer Service Training, August 2018.

Howard University NSF CAREER Program Workshop, May 2018.

College of Engineering and Architecture ABET Training. December 2016, September 2017.

Unconscious Bias Training. November 2016.

Junior Faculty Forum. November 2015, December 2015.

Teaching at Howard, December 2015, CETLA.

SR06 Getting Started with the Epson 1410wi Certification on November 2015, CETLA.

SR05 Getting Started with the 1410wi Epson BrightLink Pro Projector, October 2015, CETLA.

ILSI Information Literacy Seminar, August 2015, CETLA.

New Faculty Orientation, Howard University, August 2015.

Presentations

Conference and Workshop Talks

Harmonizing ARINC 653 and Realtime POSIX for Conformance to the FACE Technical Standard, ISORC, Online, May ‘20.

Comparison of File Systems in RTEMS, EWiLi, Turin, Italy, September ‘18.

Trustworthy Sensor Data, ESWEEK IoT Day, Turin, Italy, September ‘18.

Towards a Fail-Operational Intrusion Detection System for In-Vehicle Networks, CERTS, Porto, Portugal, November '16.

Aligning Deos and RTEMS with the FACE Safety Base Operating System Profile, EWiLi, Pittsburgh, PA, October '16.

Hardware-Enhanced Distributed Access Enforcement for Role-Based Access Control, SACMAT, London, Ontario, June '14.

Real-Time Scheduling with Hardware Data Structures, Work in Progress,

RTSS, San Diego, CA, December '10.

Fab Forensics: Increasing Trust in IC Fabrication, HST, Waltham, MA. November '10.

Hardware-enforced Fine-grained Isolation of Untrusted Code, SecuCode, Chicago, IL, November '09.

Information leakage in mix networks with randomized partial checking, ISP-09, Orlando, FL, July '09.

Posters

"Track and Fallback: Intrusion Detection to Counteract Carjack Hacks with Fail-Operational Feedback", NSF CPS PI Meeting, Alexandria, VA, November '17.

"Security and Provenance in the Internet of Things", Computing Community Consortium (CCC) Symposium on Computing Research Addressing National Priorities and Societal Needs, Washington, DC, May '16.

"Secure Data Provenance for Internet of Things (IOT)", HU Research Week, April '16.

"Cybersecurity for Satellite Middleware", HU Research Week, April '16.

"FPGA SoC Architecture and Runtime to Prevent Hardware Trojans from Leaking Secrets", IEEE International Symposium on Hardware-Oriented Security and Trust, HOST 2015, McLean, VA, May '15

"Hardware and Software Support for Fine-Grained Memory Access Control and Encapsulation in C++," ACM SIGPLAN Systems, Programming, Languages and Applications: Software for Humanity, SPLASH, Indianapolis, IN, October '13

"Automation for Creating and Configuring Security Manifests for Hardware Containers," 4th Symposium on Configuration Analytics and Automation. SafeConfig, Arlington, VA, October '11.

"Hardware Data Structures," Fifth Annual SEAS Student Research and Development Showcase, GW '11.

"Real-Time Scheduling with Hardware Data Structures," IEEE Real-Time Systems Symposium, 2010. RTSS,. San Diego, CA, December '10.

"Hardware-enforced Fine-grained Isolation of Untrusted Code," Fourth Annual SEAS Student Research and Development Showcase, GW '10.

"OS Support for Detecting Trojan Circuit Attacks," 2nd IEEE International Workshop on Hardware-Oriented Security and Trust. HOST, San Francisco, CA, July '09.

"SHADE: Secure Heartbeat And Dual-Encryption," Third Annual SEAS Student Research and Development Showcase, GW '09.

"Secure Bulletin Boards," First Annual SEAS Student Research and Development Showcase, GW '07.

Panel Presentations

Senior Design Career Panel, George Washington University, Nov '16.

Senior Design Career Panel, George Washington University, Dec '15.

Invited Talks and Guest Lectures

Automotive Intrusion Detection Systems: A Fail-Operational Perspective, Colorado State University, Fort Collins, CO, October '19.

CICI: SSC: Real-Time Operating System and Network Security for Scientific Middleware, NSF CC*/CICI PI Meeting, College Park, MD, September 2018.

Resilience in Automotive Intrusion Detection Systems, University of Illinois at Champaign-Urbana (UIUC) Critical Infrastructure Resilience Institute Seminar, August '18.

Automotive Cybersecurity in the Connected World, ISACA GWDC Annual Meeting, Rosslyn, VA, June '18.

Track and Fallback: Intrusion Detection to Counteract Carjack Hacks with Fail-Operational Feedback, Lightning Talk, NSF CPS PI Meeting, Alexandria, VA, November '17.

Automotive Intrusion Detection Systems, Virginia Tech NVC, October '17.

Cyber-Physical System (CPS) and Internet of Things (IoT) Research in the Embedded Systems Security Lab (ESSL), AT&T Public Sector Solutions, May '17.

Security and Privacy in the Internet of Things, T.C. Williams High School, July '16.

Google Code-In, T.C. Williams Minnie Howard Campus, Nov '15.

MORPH: an FPGA SoC to Defend Against Hardware Trojans, Cryptography Reading Club, National Institute of Standards and Technology, NIST, Dec '14.

RTEMS in Google Code-In, presentation given to Google Code-In grand prize winners and Open Source Programs Office, Google San Francisco, April '14.

RTEMS Kickstart, 3-day training for flight software engineers, Johns Hopkins University Applied Physics Laboratory, May '13.

Introduction to Google Summer of Code, seminar talk given to GW ACM Student group, Spring '11.

C Review, Part 2: Structures and Buffer Overflows, guest lecture given to Computer Architecture I, GW, Fall '10.

C Review, Part 1: Pointers and The Program Stack, guest lecture given to Computer Architecture I, GW, Fall '10.

IO Streams, guest lecture, Intro. to OS, GW, Fall '08.

Distributed File Systems, guest lecture, Intro. to OS, GW, Fall '08.

Concurrency: Semaphores" guest lecture, Intro. to OS, GW, Fall '08.

Game Console Platforms, guest lecture, Intro. to OS, GW, Fall '07

Other Work Experience

Consulting (Software Engineering, Healthcare IT), Independent, '13-'20

Research Assistant, George Washington University, '08-'13

RTEMS Project contributor and core developer , 09-current
Google Summer of Code Student '10, Mentor '11-'20, Org. Admin. '12-'20
Google Code-In Mentor and Org. Admin. ('12, '13, '15, '16, '18)

Teaching Assistant (TA), George Washington University, '06-'08, '11

Consultant, Bloom Road Consulting Group LLC, Brentwood TN, '04-'06

Grader, Michigan Technological University, '04

Restaurant and service industry, various locations, 1995-2003

Association Membership

ACM Senior Member (M'09, SM'19)
SIGARCH, SIGBED, SIGCSE, SIGOPS, SIGSAC

IEEE Senior Member (M '09, SM '19)
IEEE Computer Society, Member.
IEEE Computer Society Technical Committee on Real-Time Systems, Member.

Languages

English, native

Spanish, conversational

Finnish, novice

References

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