Robert G Pettit IV

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"Pursue some path, however narrow and crooked, in which you can walk with love and reverence." - *Henry David Thoreau*

Education

University of Evansville **Evansville, IN**
B.S. Computer Science / Mathematics *1991*
Capstone project delivered real-time software modeling and simulation capability to the USMC

George Mason University **Fairfax, VA**
M.S. Software Systems Engineering *1995*
Specialized in real-time embedded software design

George Mason University **Fairfax, VA**
Ph.D. Information Technology and Engineering (Software Engineering Track) *2003*
"Analyzing Dynamic Behavior of Concurrent Object-Oriented Software Designs"

Experience

Academia

George Mason University **Fairfax, VA**
Professor of Practice, Associate Chair for Graduate Studies, Computer Science *2021–Present*
Leveraging industry experience in the teaching and development of courses in Software Modeling and Architecture Design (SWE 621); Software Engineering (CS 321); and Software Engineering for Real-Time Embedded Systems (SWE 660), which I designed from the ground up ▪ Program Director, Online MS CS ▪ Program Director, Computing Foundations bridge program ▪ GMU representative to MS Pathways to Computing Consortium ▪ Chair, MS CS Admissions Committees ▪ Chair, Graduate Studies Committee ▪ CS Department Coordinator for Virginia's Tech Talent Investment Program (TTIP) ▪ Launched first faculty-led Computer Science study abroad programs for GMU - becoming one of only 4 universities in the US to offer such programs and the only one offering graduate credit ▪ Instrumental in establishing partnerships with Indian universities for accelerated and joint master's pathways; centers of excellence; and research collaborations

George Mason University **Fairfax, VA**
Adjunct Professor, Computer Science *2003–2021*
Course design and instruction for Software Modeling and Architecture Design (SWE 621); Real-Time Embedded Project Lab (SWE 626); Software Architecture (SWE 443); Software Engineering (CS 321) ▪ Advisory Board, ECE Small Satellite Engineering Certificate Program ▪ Industry Advisory Board, Computer Science Department

The University of Alabama **Tuscaloosa, AL**
Graduate Faculty, Computer Science Department *2019–2021*
External Ph.D. committee member for Xin Zhao, "Evolution of System Models: Bad Smells, Refactoring and Metrics"

Virginia Tech **Falls Church, VA**
Adjunct Professor, Computer Science *2009–2018*
On-line and in-person (Falls Church Campus) instruction for Software Design (CS 5744); Software Engineering (CS 5704); Concurrent and Real-Time Programming (CS 5944)

Industry

The Aerospace Corporation **Chantilly, VA**
Senior Project Leader, Spaceflight Software (FSW) - Retired *1999–2021*
East Coast lead for flight software mission assurance supporting National Security Space, Earth-observation, and crewed and uncrewed interplanetary exploration missions ▪ Technical advisor for NASA and other agency research grants and acquisition efforts ▪ Principal Investigator for approximately $5M of corporate research projects and technical supervision of up to 30 researchers ▪ Most recent research focuses on the use of machine learning in real-time onboard flight software

Software Productivity Consortium **Herndon, VA**
Team Lead, Software Modeling and Design *1995–1999*
Led Consortium's product line on software modeling and design with supervision of up to 10 MTS ▪ Authored Consortium's UML-based software design methodlogy ▪ Developed and taught ADARTS-95 software design approach employed by the F22 program ▪ Co-authored Ada 95 Quality and Style, used as the international programming standard for the Ada 95 language

Sallie Mae **Herndon, VA**
Software Architect, Office of the CIO *1994–1995*
Designed and implemented corporate software development standards ▪ Provided technical advice for the corporate software process improvement initiative and for corporate software development methods

E-Systems, Melpar Division **Falls Church, VA**
Computer Scientist *1991–1994*
Designed and developed software for remotely controlled real-time intelligence systems ▪ Software team leader for a real-time signal processing subsystem ▪ Supported field site-test and installation activities for mission-critical software

Naval Weapons Support Center **Crane, IN**
Computer Scientist *1989–1991*
Designed and developed real-time simulations for Marine Corps missile systems

Bristol-Myers **Evansville, IN**
Systems Programmer *1987–1989*
Developed FDA-certified real-time automation system for pharmaceutical production processes ▪ Responsible for software design, development, testing, and maintenance

Professional Activities & Certifications

Institute of Electrical and Electronics Engineers (IEEE): Senior Member

FCC Amateur Radio License: KN4EZY

International Journal of Software and Systems Modeling (SoSyM): Editor

International Symposium for Object-oriented Real-time Computing (ISORC): Steering Committee Co-Chair ▪ Former 3x General Chair

International Conference on Model Driven Engineering Languages and Systems (MODELS): Fomer General Chair ▪ Current Program Committee Member

International Conference on Model-Driven Engineering and Software Development (MODELSWARD): Program Committee Member

ACM SigAda Conference: Former Tutorial Chair

IFIP Workshop on Software Technologies for Embedded and Ubiquitous Computing Systems (SEUS): Former Program Chair

Machine Learning by Stanford University on Coursera: Specialization Certificate earned on April 27, 2020

Awards

- GMU Computer Science Department - Outstanding Service Award
- GMU Computer Science Department - Outstanding Adjunct Faculty (Multiple)
- GMU Volgenau School of Engineering - Outstanding Alumnus
- US Department of Defense - Top 5 Quality Software Projects Award
- The Aerospace Corporation - Team Achievement Award for Flight Software
- The Aerospace Corporation - Program Recognition Award (Multiple)
- The Aerospace Institute - Instructor Recognition Award

Volunteer and Community Activities

Microsoft Philanthropies / TEALS: Volunteer to assist high school computer science teachers

Loudoun County Public Schools: Judge for Regional Science and Engineering Fair ▪ STEM outreach for Aerospace Science courses

USA Track & Field: USATF Level 2 (Collegiate) Certified Coach, Throws ▪ Boys Head Coach / Throwing Coach, Woodgrove High School ▪ Founder and Head Coach, Western Loudoun Throwers Federation ▪ Coached athletes to two All American finishes in Shot Put and Discus ▪ Coached Virginia record holder in boys Shot Put

Safe Zone Trained

US Center for Safe Sports Trained

American Red Cross Certification in Adult First Aid and CPR

Invited Talks

"Mission-Critical Mindset: Aerospace Software Engineering Principles for Reliable Systems Across Industries", India Defense Institute for Advanced Technologies, Pune, India, October 2025

"The Future of Embedded Software Systems," Panelist, IFIP 7th International Embedded Systems Symposium (IESS), Lippstadt, Germany, November 2022

"Pains in Model-Based Engineering –Views from an IV&V Perspective," ACM/IEEE 21st International Conference on Model Driven Engineering Languages and Systems (MODELS), Copenhagen, Denmark, October 2018

"Computer Science in Space," University of Evansville Computer Science Department, Evansville, IN, USA, March 2017

"Model Based Engineering Challenges for the Spaceflight Software Domain," Keynote Address to the International Workshop on the Globalization of Modeling Languages (GeMOC), Miami Beach, FL, USA, October 2013

"Flight Software Risk Mitigation Through Early Modeling and Analysis," PMAG Symposium, Los Angeles, CA, February 2009

"Model-Based Design and Development of Real-Time Embedded Systems," Lancaster University Department of Computing, Lancaster, England, January 2008

"Modeling and Analysis for Real-Time Software Systems," Technische Universität Wien, Real Time Systems Group, Vienna, Austria, October 2006

"Careers in Mission-Critical Software Engineering," University of Virginia, Student Chapter of ACM,

Charlottesville, VA, USA, April 2006.

"Applicability of UML for Real-Time Systems," Panelist, International Workshop on the Specification and Verification of UML Models for Real-Time and Embedded Systems (SVERTS), Lisbon, Portugal, October 2004

"Lessons Learned Applying UML in the Design of Embedded Software Systems," Workshop on Software Technology for Future Embedded and Ubiquitous Systems (WSTFEUS), Vienna, Austria, May 2004.

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Publications

Abhishek Dey, Saurabh Srivastava, Gaurav Singh, and Robert G. Pettit. Real-time performance benchmarking of tinyml models in embedded systems (PICO: performance of inference, cpu, and operations). In *27th IEEE International Symposium on Real-Time Distributed Computing, ISORC 2024, Tunis, Tunisia, May 22-25, 2024*, pages 279–284. IEEE, 2025.

Abhishek Dey, Saurabh Srivastava, Gaurav Singh, and Robert G. Pettit. Real-time performance benchmarking of tinyml models in embedded systems (PICO: performance of inference, cpu, and operations). *CoRR*, abs/2509.04721, 2025.

Sree Charitha Meka, Sanjana Achan, and Robert G. Pettit IV. Real-time embedded monitoring technologies in modern healthcare systems: A survey. In *27th IEEE International Symposium on Real-Time Distributed Computing, ISORC 2024, Tunis, Tunisia, May 22-25, 2024*, pages 1–6. IEEE, 2024.

Julie S. Fant and Robert G. Pettit. Mbse mission assurance. In A. Madni and N. Augustine, editors, *Handbook of Model-Based Systems Engineering*. Springer, 2023a.

Julie S Fant, Robert G Pettit, and David Gayek. A quantitative approach for calculating model assurance levels. In *22nd International Symposium on Real-Time Computing (ISORC)*, pages 69–76. IEEE, 2019.

Julie S Fant and Robert G Pettit. Model assurance levels (MALs) for managing model-based engineering (MBE) development efforts. In *7th International Conference on Model-Driven Engineering and Software Development (MODELSWARD)*, pages 542–549. ACM, 2019.

Robert G Pettit and Aedan D Pettit. On the feasibility of automatically detecting and recovering from SEUs in cyber-physical space systems. In *4th International Workshop on Software Engineering for Smart Cyber-Physical Systems at ICSE 2018*, pages 26–29, 2018.

Robert G Pettit and Aedan D Pettit. Detecting single event upsets in embedded software. In *21st International Symposium on Real-Time Distributed Computing (ISORC)*, pages 142–145. IEEE, 2018.

Julie Street Fant, Hassan Gomaa, and Robert G Pettit. A model-based approach for integrating executable architectural design patterns in space flight software product lines. In *11th International Conference on Software Technologies (ICSOFT)*, pages 287–306. Springer, 2016.

Julie Street Fant, Hassan Gomaa, and Robert G Pettit. Integrating and applying architectural design patterns in space flight software product lines. In *10th International Conference on Software Technologies (ICSOFT)*, volume 1, pages 1–11. IEEE, 2015.

Robert G Pettit, Navneet Mezcciani, and Julie Fant. On the needs and challenges of model-based engineering for spaceflight software systems. In *17th International Symposium on Real-Time Computing ISORC*, pages 25–31. IEEE, 2014.

Emad Albassam, Hassan Gomaa, and Robert G Pettit. Experimental analysis of real-time multitasking on multicore systems. In *17th International Symposium on Real-Time Computing (ISORC)*, pages 72–75. IEEE, 2014.

Robert G Pettit and Navneet Mezcciani. Highlighting the challenges of model-based engineering for spaceflight software systems. In *International Workshop on Modeling in Software Engineering (MiSE)*, pages 51–54. IEEE, 2013.

Julie S Fant, Hassan Gomaa, and Robert G Pettit. Modeling executable architectural design patterns for software product lines. In *ACESMB@ MoDELS*, 2013.

Julie Street Fant, Hassan Gomaa, and Robert G Pettit. A pattern-based modeling approach for software product line engineering. In *46th Hawaii International Conference on System Sciences (HICSS*, pages 4985–4994. IEEE, 2013.

Julie Street Fant, Hassan Gomaa, and Robert G Pettit. A comparison of executable model based approaches for embedded systems. In *Second International Workshop on Software Engineering for Embedded Systems (SEES)*, pages 16–22. IEEE, 2012.

Julie Street Fant, Hassan Gomaa, and Robert G Pettit. Software product line engineering of space flight software. In *Third International Workshop on Product LinE Approaches in Software Engineering (PLEASE)*, pages 41–44. IEEE, 2012.

Julie Street Fant, Hassan Gomaa, and Robert G Pettit. Architectural design patterns for flight software. In *14th IEEE International Symposium on Real-Time Computing (ISORC)*, pages 97–101. IEEE, 2011.

Robert G. Pettit, Hassan Gomaa, and Julie S Fant. Modeling and prototyping of real-time embedded software architectural designs with colored Petri nets. In *4th International Workshop on Model Based Architecting and Construction of Embedded Systems (ACESMB)*, page 85, 2011.

Robert G Pettit. Design and development of concurrent, embedded, and real-time software using UML and Ada 2005. *ACM SIGAda Ada Letters*, 30(3):7–8, 2010.

Julie Fant, Hassan Gomaa, and Robert Pettit. Designing command and data handling (C&DH) subsystems from software architectural design patterns. In *Workshop on Spacecraft Flight Software*.

Robert G Pettit. Designing real-time, concurrent, and embedded software systems using UML and Ada. In *International Conference on Reliable Software Technologies*, pages 199–210. Springer, Berlin, Heidelberg, 2009.

Julie A Street and Robert G Pettit. An experimental evaluation of software performance modeling and analysis techniques. In *2nd International Conference on Software Technologies (ICSOFT)*, pages 417–420, 2007.

Robert G. Pettit. Evaluating concurrent software architectures using Petri nets. In *30th International Conference on Application and Theory of Petri Nets and Other Models of Concurrency - Tutorial*. Springer, 2009.

Peter Puschner, Raimund Kirner, and Robert G Pettit. Towards composable timing for real-time programs. In *2009 Software Technologies for Future Dependable Distributed Systems*, pages 1–5. IEEE, 2009.

Julie S Fant and Robert G Pettit. Cost-performance tradeoff for embedded systems. In *IFIP International Workshop on Software Technolgies for Embedded and Ubiquitous Systems*, pages 198–208. Springer, Berlin, Heidelberg, 2008.

Robert G Pettit. Increasing confidence in concurrent software through architectural analysis. In *International Conference on Reliable Software Technologies*, pages 199–210. Springer, Berlin, Heidelberg, 2008.

Julie A Street, Robert G Pettit, and Hassan Gomaa. Independent model-driven software performance assessments of uml designs. In *10th IEEE International Symposium on Object and Component-Oriented Real-Time Distributed Computing (ISORC)*, pages 299–306. IEEE, 2007.

Robert G Pettit and Hassan Gomaa. Analyzing behavior of concurrent software designs for embedded systems. In *10th IEEE International Symposium on Real-Time Computing (ISORC)*, pages 124–132. IEEE, 2007.

Robert G Pettit and Hassan Gomaa. Modeling behavioral design patterns of concurrent objects. In *Proceedings of the 28th International Conference on Software Engineering (ICSE)*, pages 202–211, 2006.

Julie A Street and Robert G Pettit. Lessons learned applying performance modeling and analysis techniques. In *Ninth IEEE International Symposium on Real-Time Computing (ISORC)*, pages 7–pp. IEEE, 2006.

Julie A Street and Robert G Pettit. The impact of UML 2.0 on existing UML 1.4 models. In *International Conference on Model Driven Engineering Languages and Systems*, pages 431–444. Springer, Berlin, Heidelberg, 2005.

Robert Pettit and Hassan Gomaa. Modeling and analysis of concurrent and real-time object-oriented designs. In *International Conference on Model Driven Engineering Languages and Systems MODELS), year=2005, organization=ACM/IEEE*.

Robert G Pettit and Hassan Gomaa. Modeling behavioral patterns of concurrent software architectures using Petri nets. In *Proceedings. Fourth Working IEEE/IFIP Conference on Software Architecture (WICSA 2004)*, pages 57–66. IEEE, 2004.

Robert G Pettit. Lessons learned applying UML in embedded software systems designs. In *Second IEEE Workshop on Software Technologies for Future Embedded and Ubiquitous Systems, 2004. Proceedings.*, pages 75–79. IEEE, 2004.

Robert G Pettit and Julie A Street. Lessons learned applying UML in the design of mission critical software. In *International Conference on the Unified Modeling Language*, pages 129–137. Springer, Berlin, Heidelberg, 2004.

Robert G. Pettit. *Analyzing dynamic behavior of concurrent object-oriented software designs*. PhD thesis, George Mason University, 2003.

Robert G Pettit and Hassan Gomaa. Improving the reliability of concurrent object-oriented software designs. In *International Workshop on Object-oriented Real-time Distributed Systems (WORDS)*, pages 262–269. IEEE, 2003.

Robert G. Pettit. Improving the reliability of object-oriented architecture designs: An approach using colored Petri nets. In *Symposium on Reliable Object-Oriented Programming (SROOP 2001)*, 2001.

Robert G Pettit and Hassan Gomaa. Modeling state-dependent objects using colored Petri nets. In *CPN 01 Workshop on Modeling of Objects, Components, and Agents*, 2001.

Robert G. Pettit and Hassan Gomaa. Validation of dynamic behavior in uml using colored Petri nets. In *International Conference on the Unified Modeling Language (UML)*, pages 295–302. Springer Verlag, 2000.

Robert G Pettit and Hassan Gomaa. *Consortium Object-Oriented Software Engineering using UML (COSUML)*. Software Productivity Consortium, 1998.

Christine Ausnit-Hood, Kent A Johnson, Robert G Pettit, and Steven B Opdahl. *Ada 95 Quality and Style: Guildelines for Professional Programmers*. Springer, 1997.

Christine Ausnit-Hood and Robert G Pettit. Ada 95 quality and style. In *Software Technology Conference (STC)*. IEEE, 1997.

Robert G Pettit and Hassan Gomaa. Integrating Petri nets with design methods for concurrent and real-time systems. In *Proceedings of ICECCS'96: 2nd IEEE International Conference on Engineering of Complex Computer Systems (held jointly with 6th CSESAW and 4th IEEE RTAW)*, pages 168–171. IEEE, 1996.

Robert G Pettit. Using Ada 95 for the design of distributed real-time systems. In *Proceedings of the conference on TRI-Ada'96: disciplined software development with Ada*, pages 49–55, 1996.

Robert G Pettit and Hassan Gomaa. A software design method for Ada 95 based concurrent and real-time systems. In *Annual International Conference on Ada: Proceedings of the conference on TRI-Ada'95: Ada's role in global markets: solutions for a changing complex world*, volume 5, pages 144–147, 1995.