

**CURRICULUM VITAE - PAUL F. REYNOLDS, JR.**  
**April, 2016**

Professor Emeritus

Dept of Computer Science  
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Summary:

Paul F. Reynolds, Jr. joined the Computer Science faculty at the University of Virginia in 1980, departing in August 2012 to pursue expert advisory opportunities in government and industry. His primary research activities are in simulation technology, parallel and distributed computing, high performance networking, software quality, and software analysis. He has been awarded over 60 grants. He has conducted research sponsored by DARPA, the National Science Foundation, DUSA (OR), the National Institute for Science and Technology, the Defense Modeling and Simulation Office, Virginia Center for Innovative Technology and numerous industries. His most recent research while at UVa addressed simulation issues –fault localization in simulations, uncertainty management, and automated determination of sources of unexpected outcomes. He led two interdisciplinary institutes: The Institute for Parallel Computation and the Modeling and Simulation Technology Research Initiative (MaSTRI) at UVa. With one of his PhD students he co-published the first general, rigorous approach to multi-resolution modeling. Funded by DARPA and NSF, he was a co-architect of Isotach Networks, capable of supporting scalable concurrent caches with message delivery order guarantees. Two special-purpose, ASIC-based, hardware networks were built based on his technologies.

Professor Reynolds has supervised to completion 65 graduate degrees, including sixteen Ph.D. students. Half of his Ph.D. students hold faculty positions in U.S. universities, including CMU and the University of Illinois. His record for graduating women and minority graduate students ranks among the best in his department. He co-advised a winner of the UVa Engineering School's annual senior thesis competition and five finalists. He was awarded multiple teaching awards. In 2009 he advised the national second place finisher (Erin Carson) in the annual Computing Research Association undergraduate research award competition.

He has served in numerous leadership roles within the Department of Defense, including initial setup and later oversight of the Joint National Test Facility in Colorado Springs, and conceptualization and design of the DoD High Level Architecture for Modeling and (distributed) Simulation (standard: IEEE 1516).

Currently, Professor Reynolds is a University Expert for the U.S. Army in cyber analysis at the National Ground Intelligence Center in Charlottesville. Also, he is actively engaged as a subject matter expert in patent litigation, having supported ten Patent Office petitions for Inter Partes Review in the last 3-1/2 years. He has recently been an expert for Shine S&T on a Virginia SBDC grant, regarding identification of viable IP in modeling and simulation technologies.

## Paul F. Reynolds, Jr.

### Personal

Born: Cleveland, Ohio, 5 Nov 1948  
Marital Status: Married, Three Grown Children

### Education

Ph. D. (Computer Science) University of Texas at Austin, 1979  
M. S. (Computer Science) University of Texas at Austin, 1975  
B. A. (Psychology) Ohio Northern University, Ada, Ohio, 1970

### Professional Fulltime Employment History

Professor Emeritus, Computer Science, University of Virginia, Aug, 2012 – present  
Professor, Computer Science, University of Virginia, 1998 - 2012  
Associate Professor, Computer Science, University of Virginia, 1986 – 1998.  
Director, Institute for Parallel Computation, U. Virginia, Aug, 1987 - June, 1989.  
Associate Director, Institute for Parallel Computation, University of Virginia,  
Dec, 1986 - Aug, 1987.  
Assistant Professor, Computer Science, University of Virginia, 1980 - 1986.  
Instructor, Computer Science, University of Texas at Austin, 1979 - 1980.  
Software Architect and Developer, Tracor, Inc., Austin, Tx. 1975 – 1977.

### Selected Professional Consulting/Expert History

Design/develop VideoSpeedTracker: <https://github.com/pfr/VideoSpeedTracker> (2016)  
Patent subject matter expert (2012 – 2016) See next page for details.  
Shine S&T (2011- present) Intellectual property identification and advancement.  
U.S. Army, NGIC (1992-present) (Active clearance: TS/SCI) Software analysis, emitter description and analysis.  
Into Networks (2000-2001) High performance networks.  
Vanguard Research (1996-1999) Committee Chair, Joint National Test Facility review, Colorado Springs.  
Institute for Defense Analyses (1994-1998) DoD Modeling and Simulation High Level Architecture (IEEE standard 1516).  
Mystech (1990-1996) High performance simulation.  
MITRE (1987-1989) Stand-up of DoD Joint National Test Facility, Colorado Springs.  
NASA/ICASE (1986-1992) High performance networks.  
IBM (1981-1985) High performance networks.  
Honeywell (1978-1980). Capacity planning and analysis.

## Patent Expert Experience (2012 – 2016)

Expert on ten IPR's  
Deposed nine times  
Testimony: none (but would like to)

- US6631449 (Borrill) Dec 2012 expert for IPR filed with PTAB  
Deposed Spring 2013. Case settled.  
May 2013 expert for IPR filed with PTAB  
Case settled.  
Sept 2015 expert for IPR filed with PTAB  
PTAB institutes trial March 2016, deposition scheduled.
- US6918014 (Borrill) Dec 2012 expert for IPR filed with PTAB  
Deposed Spring 2013. Case settled.
- US5825891 (Levesque) Dec 2012 expert for IPR filed with PTAB  
Deposed Spring 2013. Case settled.  
May 2013 expert for IPR filed with PTAB  
Case settled.  
Dec 2013 expert for IPR filed with PTAB  
Deposed Spring 2014. Case settled.  
July 2014 expert for IPR filed with PTAB  
Deposed Feb 2015.  
Deposed July 2015. All claims invalidated by PTAB, Oct 2015.
- US6259381 (Small) April 2014 expert for IPR filed with PTAB  
Deposed Fall 2014. All claims invalidated by PTAB, Oct 2015.
- US7032089 (Ranade) Aug 2014 expert for IPR filed with PTAB  
Deposed March 2015.  
Deposed July 2015. All claims invalidated by PTAB, Dec 2015.

## Refereed Journal Publications (Reynolds student names underlined)

Gore, R., **P.F. Reynolds, Jr.**, Statistical Debugging for Simulations, *ACM Transactions on Computer Modeling and Simulation*, submitted, accepted with revisions, 2014.

Gore, R., **P.F. Reynolds, Jr.**, INSIGHT : A Methodology for Understanding Unexpected Behaviors in Agent-Based Models, *Journal of Simulation*, Volume 4, Issue 1, pg. 170. September 2010.

Honkanen, H, Liuti,S., Carnahan, J., Loitiere, Y, **P.F. Reynolds, Jr.**, New Avenue to the Parton Distribution Functions: Self-Organizing Maps, *Phys. Rev. D* 79, 034022 (2009); arXiv:0810.2598

Giordano, J. and **P.F. Reynolds, Jr.**, "WARSIM 2000: A Case for Technological Subject Matter Experts," *Journal of Defense Modeling and Simulation*, Fall, 2004

Pullen, J.M. and **P.F. Reynolds, Jr.**, Guest Editors "Special Issue of Papers from the Distributed Simulation - Real Time Applications Workshop," *SCS Transactions, Society for Computer Simulation*, 2002.

Morse, K., M. Petty, **P.F. Reynolds, Jr.**, W. Waite, and P. Zimmerman, Findings and Recommendations from the 2003 Composable Mission Space Environments Workshop, *Simulation Technology, Volume 7, Issue 2, September 9 2004*

Williams, C., **P.F. Reynolds**, and B.R. de Supinski, "Delta Coherence Protocols," *IEEE Concurrency*, Spring, 2000.

Srinivasan, S. and **P. F. Reynolds, Jr.**, "Elastic Time," *ACM Transactions on Modeling and Computer Simulation*, 35 pages, (April, 1998).

**Reynolds, Jr., P.F.**, S. Srinivasan and A. Natrajan, "Consistency Maintenance in Multi-Resolution Simulations," *ACM Transactions on Modeling and Computer Simulation*, pp. 368-392 (July 1997).

**Reynolds, Jr., P.F.**, C.C. Williams and R. Wagner, Jr., "Isotach Networks," *IEEE Trans on Parallel and Distributed Systems*, 8,4, pp 337-349, (April, 1997).

Dickens, P., D. Nicol, **P.F. Reynolds, Jr.**, and M. Duva, "Analysis of Bounded Time Warp and Comparison with YAWNS," *ACM Transactions on Modeling and Computer Simulation*, pp. 297-320 (October, 1996).

Williams, C.C., and **P.F. Reynolds, Jr.**, "Combining Atomic Actions," *Journal of Parallel and Distributed Computing*, pp. 152-163 (Feb, 1995).

**Reynolds, Jr., P.F.** "The Silver Bullet," - invited rebuttal to article by R. Fujimoto on the State of the Art in Parallel and Distributed Simulation, *ORSA Journal on Computing*, 5,3, pp. 239-241 (Summer, 1993).

**Reynolds, Jr., P.F.**, C. Pancerella and S. Srinivasan, "Design and Performance Analysis of Hardware Support for Parallel Simulation," *Journal of Parallel and Distributed Computing*, pp. 435-453 (Aug, 1993).

**Reynolds, Jr., P.F.**, "An Efficient Framework for Parallel Simulation," *International Journal on*

*Computer Simulation*, 2,4, pp. 427-445 (1992).

Nicol, D.M., and **P.F. Reynolds, Jr.**, "Optimal Dynamic Remapping of Parallel Computations," *IEEE Transactions on Computer Systems*, pp. 206-219 (Feb, 1990).

Carson, S.D. and **P.F. Reynolds, Jr.**, "The Geometry of Semaphore Programs," *ACM Transactions on Programming Languages and Systems*, 9,1, pp. 25-53 (Jan, 1987).

O'Hallaron, D.R. and **P.F. Reynolds, Jr.**, "A Generalized Deadlock Predicate," *Information Processing Letters*, pp. 181-188 (Nov, 1986).

## Refereed Conference Publications (Reynolds student names underlined)

Dutton, K., R. Gore, **P.F. Reynolds Jr.**, "Investigating Unexpected Outcomes through the Application of Statistical Debuggers," ACM/IEEE Winter Simulation Conference, 2012.

Gore, R., **P.F. Reynolds Jr.**, "Reducing Confounding Bias in Predicate-level Statistical Debugging Metrics," International Conference on Software Engineering, ICSE, June 2012.

Gore, R., **P.F. Reynolds Jr.**, "Modifying Test Suites to Enable Effective Predicate-Level Statistical Debugging," In Alwyn Goodloe and Suzette Person, editors, NASA Formal Methods, volume 7226 of Lecture Notes in Computer Science, pages 70-84. Springer Berlin / Heidelberg, 2012.

Gore, R., **P.F. Reynolds Jr.**, D. Kamensky, "Statistical Debugging with Elastic Predicates," ACM/IEEE Automated Software Engineering Conference, 2011

Kamensky, D., R. Gore, and **P.F. Reynolds Jr.** "Applying Enhanced Fault Localization Technology to Monte Carlo Simulations. In Proceedings of the 43rd Winter Simulation Conference, pages 2798-2809, San Diego, CA, USA, 2011 (**Finalist, Best Paper Award**).

Tolk, A., **P.F. Reynolds Jr.**, O. Balci, B. Ziegler, "Standards for Modeling and Simulation," In Proceedings of the 43rd Winter Simulation Conference, WSC '11, San Diego, CA, USA, 2011.

Gore, R., **P.F. Reynolds Jr.**, "Improved Methods and Measures for Computing Dynamic Program Slices in Stochastic Simulations," ACM/IEEE Winter Simulation Conference, Dec, 2010.

Spiegel, M., **P.F. Reynolds Jr.**, "Lock-Free Multiway Search Trees," ACM/IEEE International Conference on Parallel Processing, Sept, 2010.

Gore, R., **P.F. Reynolds Jr.**, "Program Slice Distribution Functions," ACM/IEEE Winter Simulation Conference, Dec, 2009.

Gore, R., **P.F. Reynolds Jr.**, "Causal Program Slicing To Understand Program Behavior," IEEE/SCS Workshop on Principles of Advanced and Distributed Simulation, June 2009.

Tang, L. and **P.F. Reynolds Jr.** "Exploiting User Insight for Efficient Simulation Adaptation" 2008 VMASC Capstone M&S Conference

Spiegel M., R. Gore, and **P.F. Reynolds Jr.** "Quantifying and Analyzing Uncertainty in Simulations to Enable User Understanding" 2008 VMASC Capstone M&S Conference. Won Best Paper/Presentation Award in its track.

Gore, R., **P.F. Reynolds Jr.**, L. Tang, and D. Brogan "Explanation Exploration: Exploring Emergent

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