Claudio Pinello

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US Citizen, Italian Citizen

Objectives

I am a passionate problem solver. I am currently the Leader of the Systems Engineering Discipline in the Intelligent Systems department of the Raytheon Technologies Research Center. My main focus has been in pushing for the wider adoption of modern Model Based System Engineering technologies and sound SW engineering technologies at the business units of Raytheon Technologies and at the research center. I enjoy building effective teams and developing both leaders and individual contributors. I truly value and enjoy collaboration and teamwork, and I take pride in my technical achievements and in the credibility I built with my stakeholders and colleagues.

I am looking for an opportunity to leverage my skills and have a positive impact on an embedded systems company.

Highlight of skills and achievements

- 25 years of post-college experience in the area of embedded systems, spanning control theory, real-time systems, distributed and fault tolerant systems, software and hardware architectures, model based systems engineering, formal methods, symbolic AI and AI/ML. Very skilled at devising solutions by understanding the needs/problems of the customer and mapping them to existing solutions/tools, as well as identifying novel design flows to be developed.
- People manager since 2012. Expert **talent developer** through recruiting, coaching, project assignment, role changes, and training.
- **Technical leader**. Involved in setting the direction for a large industrial deployment of model-based system engineering and formal methods technologies, presenting results to and discussing next steps with the Technical Advisory Committee (composed of the CTO, Business Unit Leaders, and a panel of experts from Academia). Developed and delivered training on use of formal methods for requirements analysis.
- Effective **communicator**. Presented results and challenges at various levels of the organization, from technical team to middle and top management. Able to abstract complex technical concepts to distill business value, as well as able to follow detailed technical discussions on a broad set of topics.

- Attentive **listener**. Actively seeks confirmation of mutual understanding. Seeks input from all types of speakers. Reads the room sentiment beyond what is being said.
- Generous **team player**. Effective both in team leading and in contributing within a team. **Focus on results**.

Achievements

- Co-led wider deployment of model-based system engineering at one of the units within Hamilton Sundstrand (now part of Collins Aerospace). Developed demonstrations, analyzed requirements and identified ambiguities, conflicts, and under-specifications. Developed training material for the use of formal methods in requirements analysis and system verification, delivered the training for two consecutive years. Worked with BU leads to update engineering standard work.
- Prototyped an activity recognition system for OTIS Elevators to process first-person view video, leveraging deep-learning and symbolic AI (co-inventor on a patent).
- Co-led effort to deploy use of Virtual Simulation Integration for robustness testing and for features development of networks of Fire Detection and Alarm Systems (Autronica and Edwards, now part of Carrier). Leveraged SystemC-based simulator with integrated Qemu emulator and SystemC networking models to cross-compile and run a redundant/fault tolerant networking middleware.
- Led timing analysis implementation and the system-level models integration for automotive distributed systems at General Motors. Implemented using Visual Basic for Excel.
- Defined the Fault Tolerant Data Flow model of computation and associated tools for the design, implementation and verification of fault tolerant distributed systems (Ph.D. Dissertation, UC Berkeley).

Employment history

2020 to present	Associate Director of Research, Systems Engineering Discipline Leader. Raytheon Technologies Research Center. Berkeley Site Manager. Responsibilities include developing talent through coaching, hiring, on-the-job and formal training, and fostering collaborations with other RTRC units/groups, business units, Universities, and other external entities. Coordinate two team leads and two associate directors, in the areas of SW engineering, AI Systems Engineering, Certification, Formal Methods and Model Based Systems Engineering. Personnel at both the East Hartford and Berkeley locations. Contributed to projects on the deployment of Post-Quantum Security in the Robot Operating System (ROS), the DARPA CASE project on model-based system security, and HW-acceleration for planning problems.
2014 to 2020	Principal Research Engineer and later Associate Director of Research, Autonomy and Reasoning Technologies Group Leader. Site Manager. UTRC Managed the day to day operations of the California site. Responsibilities include interactions and alignment with various support functions in East Hartford, interactions

	with the Building Management, and ensuring a safe, efficient, engaging, and inclusive work environment. Coordinated one major site expansion in 2014, and several network upgrades and updates. Coordinated and mentored the team in Berkeley. • Deployed UML-based design capabilities to a business unit within Carrier in support of the modeling and documentation of the SW architecture of a legacy product, as well as to the modeling and definition of the newer version (2013 Outstanding Achievement Award). (Tools: IBM Rational Rhapsody, some Java) • Developed a design space exploration tool based on a formal encoding of a 3D mesh of heterogeneous materials. Applied the tool and modeling to the problem of synthesizing multi-fluid multi-material structures. Several thousand designs where explored, with some obtaining significantly better performance than traditional designs. (Tools: Microsoft Z3, Python, some Matlab scripting) • Prototyped an activity recognition system to process first-person view video, leveraging deep-learning and symbolic AI, taking into account both short-term actions and their long-term sequencing into procedures. Used a case study and videos from an OTIS Elevators application. (co-inventor on an awarded patent). (Tools: Pytorch, Python, Matlab) • Applied formal verification analysis to a subset of the FADEC controls from a Pratt & Whitney engine. The results led to improving part of the logic. (Tools: Simulink, Simulink Design Verifier, Formal Specs Verifier)
2012 to 2013	Model Based Design Discipline Lead. Coordinated MBD talent at both the East Hartford and Berkeley locations. UTRC Contributed to and led the following projects. • Use of virtual prototyping for robustness testing and for features development of networks of Fire Detection and Alarm Systems for Edwards (now part of Carrier). (Tools: SystemC/Qemu, gcc/gdb, IPV6 stack) • Application of formal methods and Model Based Design for various programs within Hamilton Sundstrand (now part of Collins Aerospace), including delivering training to business unit personnel and updating engineering standard work. (Tools: Simulink, FormalSpec Verifier, Simulink Design Verifier)
2009 to 2011	Staff Research Scientist in the Embedded Systems and Networks group, United Technologies Research Center (UTRC). Helped establish the California Office in Berkeley in 2011. Contributed to and led the following projects. • Use of simulation for robustness testing and for features development of networks of Fire Detection and Alarm Systems for Autronica and for Edwards (now part of Carrier). The added observability (particularly dynamic memory analysis and HW registers observability) and controllability (particularly fault injection and distributed breakpoints) of the simulated system contributed to accelerating the testing and debugging phases of the proprietary implementation of the AutroNet middleware protocol. (Tools: SystemC/Qemu, Valgrind Memcheck, gcc/gdb) • Application of formal methods to the analysis of requirements and to the analysis of the correspondingly implemented controls at one of the units within Hamilton Sundstrand (now part of Collins Aerospace). Maturation/clarification of

	requirements, plant models, and the co-led the development of formal verification capabilities, including delivering training to business unit personnel and updating engineering standard work. (Tools: Simulink, FormalSpec Verifier, Simulink Design Verifier)
October 2006-November 2008	Research Scientist at **Cadence Research Labs** in Berkeley. Topics: system level design, desynchronization, distribution, reliability, and low-power design. Also contributed to the definition of a method for formal verification of integrated analog circuits described in SPICE (co-inventor on an awarded patent). (Tools: Matlab, SMT, Spice, C++, SystemC, CToSilicon, limited Java)
April 2006-October 2006	Sr. Researcher at **General Motors Research**, GM Advanced Technology, Silicon Valley Office. Topics: system-level architecture exploration. Static worst-case end to end latency analysis. Architecture analysis and definition for active and passive safety systems. (Tools: Visual Basic for Excel, XML, Xqueries)
September 2004-March 2006	Project Engineer at **Quantech Global Services**, consulting for the GM Berkeley Labs (which he helped establish). Topics: architecture exploration tools and methods, for automotive distributed applications. (Tools: Visual Basic for Excel, XML, Xqueries)
May 2002-August 2002	Summer Intern at the **Cadence Berkeley Labs**. Research project: development of a library for the design of fault-tolerant systems in Metropolis (a virtual simulation environment for HW/SW codesign). (Tools: Java)
June 2000-July 2000	Stagist at the **INRIA Rhône-Alpes**, Montbonnot, France. Research project: generation of static schedules for distributed fault tolerant control systems, part of the TOLERE project. (Tools: SynDEx, C)
June 1999-August 1999	Summer Intern at the BMW Technology Office in Palo Alto CA. Research project: study and definition of a design methodology for Automotive Safety-Critical Distributed Applications, leveraging a virtual simulation environment (Tools: Matlab, withheld)
August 1998-September 2004	Graduate Student Researcher at the **Electronic Research Laboratory of UC Berkeley**. Main research projects: hybrid systems in engine control problems; embedded systems design methodology for automotive and consumer-oriented applications; fault-tolerant systems. Advisor: Prof. Alberto Sangiovanni-Vincentelli
July 1997-July 1998	Consultant to **PARADES EEIG Rome**. Development and control of hybrid models for internal combustion engine control problems. Study of engine control unit constraint-driven design methodology.

Education

- August 2004: completed the PhD in Electrical Engineering and Computer Science at the University of California, Berkeley. Major: systems. Fault Tolerant Distributed Systems.
- May 2001: received the PhD in Computing Systems Engineering from the Scuola Superiore Sant'Anna in Pisa (Italy). Hybrid Systems Control for Engine Control applications.
- June 1997: received the Dottore in Ingegneria degree summa cum laude (equivalent to a MS degree) in Electrical Engineering from the Università di Roma ``La Sapienza".

Training experience

- November 2016: Organizational Savvy. Management training.
- February 2016: Managing Diversity and Inclusion.
- December 2012: Power of Leadership. Management training.
- August 2000: training course on use of services in Cadence Cierto-VCC (Virtual Component Codesign), San Jose, CA.
- April 1998: training course on alpha-version of Cadence Felix-VCC (Virtual Component Codesign), Edinburg Scotland.

Awards

- 2013 UTC Outstanding Achievement Award for the demonstration and transition of model based controls development process to a UTC business unit
- 2009 UTRC Great Job Award for contributions to a workshop on architecture definition and restructuring for commonality of a UTC product line.
- 2007 SAE Arch T. Colwell Merit Award
- 2007 Design Automation Conference best paper
- 2007 Real-Time and Embedded Technology and Applications Symposium best paper
- 2000-2001 IBM's Research Fellowship
- 1997 dissertation award from Magneti Marelli S.P.A. for the technical contributions of his "tesi di laurea" on internal combustion engine control
- 1991-92 & 1992-93 tuition waiver from Università di Roma "La Sapienza" for outstanding academic achievement.

Publications

Patents

1. Saurabh K Tiwary, Anubhav Gupta, Joel R Phillips, Claudio Pinello, Radu Zlatanovici, *Boolean satisfiability based verification of analog circuits,* Patent number: 8341567, Cadence Design Systems, December 2012
2. Amit Bhatia, Guoqiang Wang, Mahmoud El Chamie, Claudio Pinello, Ankit Tiwari, Massimiliano L. Chiodo, *Machine learning based human activity detection and classification in first and third person videos*, Patent number: 11544931, OTIS Elevator Company, January 2023

Book Chapter

1. L. Carloni, F. De Bernardinis, C. Pinello, A. Sangiovanni-Vincentelli, M. Sgroi, *Platform-Based and Derivative Design*, chapter in book "Embedded Systems Handbook", 2005.

Journals

1. R. Varma, C. Melville, C. Pinello, T. Sahai, *Post Quantum Secure Command and Control of Mobile Agents Inserting Quantum-Resistant Encryption Schemes in the Secure Robot Operating System*, International Journal of Semantic ComputingVol. 15, No. 03, pp. 359-379, 2021
2. O. Ferrante, E. Scholte, C. Pinello; A. Ferrari; L. Mangeruca; C. Liu; C. Sofronis, *A methodology for increasing the efficiency and coverage of model checking and its application to Aerospace Systems*, SAE Int. Journal Aerospace 9(1):140-150, 2016
3. S. Tripakis, C. Pinello, A. Benveniste, Alberto Sangiovanni-Vincentelli, P. Caspi, M. Di Natale, *Implementing Synchronous Models on Loosely Time Triggered Architectures*, IEEE Transactions on COMPUTERS, Oct. 2008, Vol.57, Num.10, Pages:1300-14.
4. C. Pinello, Luca P. Carloni, Alberto Sangiovanni-Vincentelli, *Fault-Tolerant Distributed Deployment of Embedded Control Software*, IEEE Transactions on CAD, May 2008, Vol.27, Num.5, Pages:906-919.
5. L. Palopoli, C. Pinello, A. Bicchi, A. Sangiovanni-Vincentelli, *Maximizing the stability radius of a set of systems under real-time scheduling constraints*, Transactions on Automatic Control, November 2005, Vol.50, Num.11, pages: 1790-1795.
6. A. Balluchi, L. Benvenuti, M. Di Benedetto, C. Pinello, A. Sangiovanni-Vincentelli, *Automotive Engine Control and Hybrid Systems: Challenges and Opportunities*, IEEE Proceedings special issue on hybrid systems, July 2000, Vol.88, Num.7, pages: 888-912.
7. A. Balluchi, M. Di Benedetto, C. Pinello, C. Rossi, A. Sangiovanni-Vincentelli, *Hybrid Control in Automotive Applications: the Cut-off Control*, Automatica: a Journal of IFAC, Vol. 35, no. 3, pages 519-535, March 1999.

Conference Papers

1. Amit Bhatia, Kathryn Kirsch, Claudio Pinello, Ram Ranjan, *AI-Driven Design-Space Exploration for Thermo-Fluid Domains*, November 18, 2021, AAAI 2022 Workshop on AI for Design and Manufacturing (ADAM)
2. R. Varma, C. Melville, C. Pinello, T. Sahai, *Post Quantum Secure Command and Control of Mobile Agents Inserting quantum-resistant encryption schemes in the Secure Robot Operating System*, Sep 2020, Fourth IEEE International Conference on Robotic Computing (IRC)
3. Massimiliano D'Angelo, Alberto Ferrari, Ommund Ogaard, Claudio Pinello, Alessandro Ulisse, *A Simulator based on QEMU and SystemC for Robustness Testing of a Networked Linux-based Fire Detection and Alarm System*, Feb 2012, ERTS2012
4. Saurabh K Tiwary, Anubhav Gupta, Joel R Phillips, Claudio Pinello, Radu Zlatanovici, *First steps towards SAT-based formal analog verification*, ICCAD 2009.
5. Saurabh K Tiwary, Anubhav Gupta, Joel R Phillips, Claudio Pinello, Radu Zlatanovici, iSpice: *A Boolean Satisfiability Based Approach to Formally Verifying Analog Circuits*, Formal Verification of Analog Circuits (FAC 2008), Princeton, July.
6. K. Chatterjee, A. Ghosal, T. A. Henzinger, D. Iercan, C. M. Kirsch, C. Pinello, Alberto Sangiovanni-Vincentelli, *Logical Reliability of Interacting Real-Time Tasks*, Design Automation and Test in Europe, March 2008, Pages: 909-914.

7. P. Giusto, S. Kanajan, C. Pinello, M. Chiodo, *A Conceptual Data Model for the Architecture Exploration of Automotive Distributed Embedded Architectures*, Information Reuse and Integration 2007, August 2007, Pages 582-587.
8. Albert Benveniste, Paul Caspi, Marco Di Natale, Claudio Pinello, Alberto Sangiovanni-Vincentelli, Stavros Tripakis, *Loosely Time-Triggered Architectures based on Communication-by-Sampling: MoCC and Properties*, 2007 EMSOFT, Pages 231-239.
9. Abhijit Davare, Qi Zhu, Marco Di Natale, Claudio Pinello, Sri Kanajan, Alberto Sangiovanni-Vincentelli, *Period Optimization for Hard Real-time Distributed Automotive Systems*, **best paper** at the 2007 Design Automation Conference, June 2007, Pages 278-283.
10. Marco Di Natale, Paolo Giusto, Sri Kanajan, Claudio Pinello, Patrick Popp, *Architecture Exploration for Time-Critical and Cost-Sensitive Distributed Systems*, 2007 SAE World Congress, April 2007, SAE Arch T. Colwell Merit **Award**.
11. Wei Zheng, Marco Di Natale, Claudio Pinello, Paolo Giusto, Alberto Sangiovanni-Vincentelli, *Optimizing end-to-end latencies by adaptation of the activation events in distributed automotive systems*, **best paper** at the April 2007 RTAS conference, Pages: 293-302.
12. Wei Zheng, Marco Di Natale, Claudio Pinello, Paolo Giusto, Alberto Sangiovanni-Vincentelli, *Synthesis of task and message activation models in real-time distributed automotive systems*, April 2007 DATE conference, Pages 93-98.
13. Patrick Popp, Marco Di Natale, Paolo Giusto, Sri Kanajan, Claudio Pinello, *Towards a Methodology for the Quantitative Evaluation of Automotive Architectures*, 2007 DATE conference, Aug. 2007.
14. S. Kanajan, H. Zeng, C. Pinello, A. Sangiovanni-Vincentelli, *Exploring Trade-off´s Between Centralized versus Decentralized Automotive Architectures Using a Virtual Integration Environment*, 2006 DATE conference.
15. M. L. McKelvin Jr., C. Pinello, S. Kanajan, J.Wysocki, A. Sangiovanni-Vincentelli, *Model-Based Design of Heterogeneous Systems for Fault Tree Analysis*, 2006 International System Safety Conference, August 2006.
16. Haibo Zeng, Abhijit Davare, Alberto Sangiovanni-Vincentelli, Sampada Sonalkar, Sri Kanajan, Claudio Pinello, *Design Space Exploration of Automotive Platforms in Metropolis*, 2006 SAE World Congress, April 2006.
17. M. L. McKelvin Jr., G. Eirea, C. Pinello, S. Kanajan, A. Sangiovanni-Vincentelli, *A Formal Approach to Fault Tree Synthesis for the Analysis of Distributed Fault Tolerant Systems*, Emsoft, Jersey City, New Jersey, September 2005.
18. Wei Zheng, Jike Chong, C. Pinello, S. Kanajan, A. Sangiovanni-Vincentelli, *Extensible and Scalable Time Triggered Scheduling*, International Conference on Application of Concurrency to System Design, St Malo, France, June 2005.
19. M. L. McKelvin Jr., J. Sprinkle, C. Pinello, A. Sangiovanni-Vincentelli, *Fault Tolerant Data Flow Modeling Using the Generic Modeling Environment*, International Conference and Workshop on the Engineering of Computer-Based Systems (ECBS 2005), Greenbelt, Maryland, 4-5 April 2005.
20. C. Pinello, L. Carloni, A. Sangiovanni-Vincentelli, *Fault-Tolerant Deployment of Embedded Software for Cost-Sensitive Real-Time Feedback-Control Applications*, Design Automation and Test in Europe conference, Paris February 2004.

21. T.C. Meyerowitz, C. Pinello, A. Sangiovanni-Vincentelli, *A Tool for Describing and Evaluating Hierarchical Real-Time Bus Scheduling Policies*, 40th Design Automation Conference, Anaheim June 2003.
22. L. Palopoli, C. Pinello, A. Sangiovanni-Vincentelli, L. Elghaoui, A. Bicchi, *Synthesis of robust control systems under resource constraints*, Hybrid Systems: Computation and Control, March 2002.
23. A. Balluchi, M. Di Benedetto, C. Pinello, A. Sangiovanni-Vincentelli, *Mixed models of computation in the design of automotive engine control*, 40th Conference on Decision and Control, December 2001.
24. A. Balluchi, L. Benvenuti, M. Di Benedetto, C. Pinello, A. Sangiovanni-Vincentelli, *Automotive Engine and Power-Train Control: a Comprehensive Hybrid Model*, 8th IEEE Mediterranean Conference on Control and Automation, July 2000.
25. A. Balluchi, M. D. Di Benedetto, C. Pinello, A. L. Sangiovanni-Vincentelli, "*Hybrid control in automotive applications*", in Dynamical Systems, Control, Coding, Computer Vision (D. S. G. G. Picci, ed.), vol. 25 of Progress in Systems and Control Theory, pp. 449-479, Basel, Boston, Berlin: Birkh¨auser, 1999
26. M. Antoniotti, A. Balluchi, L. Benvenuti, A. Ferrari, R. Flora, W. Nesci, C. Pinello, C. Rossi, A. Sangiovanni-Vincentelli, G. Serra, M. Tabaro, *A Top-Down Constraint-Driven Methodology for Powertrain Control Systems*, in the proceedings of Global Powertrain Congress 1998.
27. A. Balluchi, L. Benvenuti, M. Di Benedetto, A. Ferrari, C. Pinello, A. Sangiovanni-Vincentelli, *Hybrid Systems and the Design of Embedded Controllers for Automotive Engine Management*, 37th Conference on Decision and Control, December 1998.
28. A. Balluchi, M. Di Benedetto, C. Pinello, A. Sangiovanni-Vincentelli, *A Hybrid Approach to the Fast Positive Force Transient Tracking Problem in Automotive Engine Control*, 37th Conference on Decision and Control, December 1998.
29. A. Balluchi, L. Benvenuti, M. Di Benedetto, A. Ferrari, C. Pinello, A. Sangiovanni-Vincentelli, *The Design of Embedded Controllers for Automotive Engine Management: the Cut-Off Case*, Cadence Technical Conference 1998, May 1998.
30. A. Balluchi, M. Di Benedetto, C. Pinello, C. Rossi, A. Sangiovanni-Vincentelli, *Hybrid Control for Automotive Engine Management: The Cut-Off Case*, proceedings of the First International Workshop "Hybrid Systems: Computation an Control", HSCC'98, Berkeley, California, Lecture Notes in Computer Science, vol. 1386, Springer-Verlag.
31. A. Balluchi, M. Di Benedetto, C. Pinello, C. Rossi, A. Sangiovanni-Vincentelli, *Cut-off in Engine Control: a Hybrid System Approach*, 36th Conference on Decision and Control, Hyatt Regency San Diego, California, December 10-12 1997.