Andrea Acquaviva
Curriculum Vitae

Personal Information

- Date of birth: 3 May 1974
- Place of birth: Mestre (Venezia), ITALY
- Nationality: Italian
- Home address: Via XXV Aprile 22, Sala Bolognese, (Bologna), ITALY.

Summary

Andrea Acquaviva graduated (summa cum laude) in Electrical Engineering at the University of Ferrara in 1999. He received a Ph.D. degree in electrical engineering from Bologna University in 2003. In 2003, Andrea Acquaviva became an Assistant Professor in computer science at Universit di Urbino (Italy). He is currently with the Department of Computer Science at Universit di Verona (Italy). He is also visiting researcher at the Ecole Politechnique Federale de Lausanne (EPFL) since 2005. From an industrial research viewpoint, Andrea Acquaviva has been research intern at HP - Hewlett Packard Laboratories (USA) in 2001 and 2002. He is owner of two HP patents (2001 and 2002) concerning software architectures for power conservation. Between 2004 and 2007 he collaborated with Freescale Semiconductor (UK) within a project concerning the development of power control techniques for mobile embedded platforms. He currently collaborates with the Freescale Network Computing System Group within a project concerning software optimization of multicore platforms. Andrea Acquaviva participated to many project founded by the government (FIRB and PRIN) and regional council (CIPE). Research interests of Prof. Andrea Acquaviva focus on distributed embedded software design with particular emphasis on multiprocessors and wireless sensor networks. Researches by Prof. Andrea Acquaviva (between 2000 and 2007) yielded more than 50 papers in international journals and peer-reviewed international conference proceedings as well as 6 book chapters.

Education

- **Master degree in Electrical Engineering (summa cum laude) at the University of Ferrara, ITALY - *July 1999***. Thesis title: Bus Interface Circtuits for Low-Power Systems.
- **Ph.D in Electrical Engineering and Computer Science, supervisor Prof. Luca Benini, Department of Electrical and Computer Engeenering (DEIS), Bologna University, ITALY - *March 2003***. The Ph.D. program was focused on embedded system programming, with particular emphasis on two main aspects: i) operating systems for low-power embedded system; ii) wireless network resources management for ubiquitous and mobile computing. Thesis Title: Energy Optimization of Streaming Multimedia Applications: A Software Perspective.

Work Experiences

- **Technical consultant within a project in collaboration with HP Italy - *2004***. The project was aimed at the design of location-aware personalized services to enhance navigation into cultural sites (archeological sites and musei) (project coordinator Luca Benini, contact person Renato Sommacal HP Italy).
- **Technical consultant for Freescale Semiconductors - *2004/2005***. The project, called XEC (eXtreme Energy Conservation, contact person Nigel Drew Freescale Semiconductor) is aimed at the development of a software power management infrastructure within the official release of Linux OS for Freescale multimedia application processors i.MX21 and i.MX31. During the project, he has developed a high abstraction level, high speed model of the operating system and application processor to test variuos power management strategies.
- **Assistant Professor in the Computer Science Department of Urbino University, ITALY - *from 2003***. Andrea Acquaviva is currently held 5 courses inside the Computer Science Degree program of Urbino University and pursuing research activity and industrial collaborations. In December 2005 his activity was evaluated and approved with merit by a government commette.
- **Assistant Professor in the Computer Science Department of Verona University, ITALY - *from 2006***. Andrea Acquaviva is currently teaching 2 courses inside the Computer Science Degree program of Verona University and pursuing research activity and industrial collaborations.

Research activity

- **Research project founded by HP Labs - *1999***. The project concerned the design of low-power software for mobile systems.
- **Winner of Young Researcher Award, Department of Electrical and Computer Engeenering, Bologna University, ITALY - *2001*** for the development of power aware operating systems for embedded devices.
- **Visiting Researcher at Hewlett-Packard LABs, Palo Alto, CA, USA - *2001 and 2002***. Worked on the design of low-power embedded operating systems. Results obtained was the release of a low-power version of eCos embedded operating system (2001) and a low-power version of Linux-Embedded operating system (2002). Both releases have been patented.
- **Visiting Professor at LSI Lab, EPFL, Lausanne - *June - July 2005***. During this period he supervised two projects. The first one was related on design of power management strategies for environmentally powered devices. The second one was related to power management for multiprocessor systems-on-chip.
- **Technical Consultant** in a government co-founded project entitled Low-power wireless video sensors: hardware-software platform design, that will involve the collaboration of four italian universities in 2006.
- **Scientific Coordinator of a research project with Freescale Semiconductors - *2005/2006***. The project is the extension of the XEC Project (eXtreme Energy Conservation, contact person Nigel Drew) described in the previous item, where the extensions are aimed at enabling advanced strategies in the previously realized power management framework.
- **Research collaborator** at the Department of Electrical and Computer Engeenering, Bologna University, ITALY. The collaboration involves the supervision of several Ph.D. and undergraduate students (Reference: Prof. Luca Benini - DEIS, Bologna University, ITALY).
- **Research collaborator** at the LSI Lab, EPFL, Lausanne. The collaboration involves the collaboration in the supervision of various research projects concerning software for multiprocessors systems and wireless sensor networks (Reference: Prof. Giovanni De Micheli - LSI-EPFL, SWITZERLAND).
- **Scientific coordinator** of a research project entitled "Multicore Exploration" with Freescale Semiconductor, Glasgow, Scotland. The project is aimed at exploring scalability proprieties of multicore architecture for telecommunication and multimedia applications (Reference: John Ralston - Freescale).

Other Scientific Activities

- **Reviewer for international journals and conferences**:
  - IEEE Transactions on Very Large-Scale Integration Systems,
  - IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems,
  - IEEE Real Time System Journal,
  - Kluwer Wireless Communication,

  - ACM Transaction on Embedded Computing Systems,
  - DAC Design and Automation Conference,
  - DATE Design and Test in Europe Conference.

- **Member of Executive and Technical Program Commettees**:

  - Design and Test in Europe Conference (DATE) (executive commettee member)
  - International Conference on VLSI System-on-Chip Design (VLSI-SOC)
  - International Symposium on Systems-on-Chip (SoC)

Teaching Activity

- **Instructor** in the Computer Science Degree program of Urbino University, ITALY:

  - *Operating Systems, II year, fundamental*, AA 2002/03, 2003/04, 2004/05, 2005/06.
  - *Multimedia Systems, II year, curriculum Integrated Multimedia Systems*, AA 2005/06.
  - *Multimedia Communication Systems, III year, curriculum Integrated Multimedia Systems*, AA 2003/04, 2004/05, 2005/06.

- **Instructor** in the Computer Science On-line Degree program of Urbino University, ITALY:

  - *Operating Systems, II year, fundamental*, AA 2005/06.
  - *Multimedia Systems, II year, curriculum Integrated Multimedia Systems*, AA 2005/06.

- **Instructor** in the Computer Science Degree program of Verona University, ITALY:

  - *Comuter networks, II year, fundamental*, AA 2007/08.
  - *Distributed embedded systems, V year*, AA 2007/08.

Current Research Interests

- Multicore platforms and MPSoCs: i) Scalability and load balancing of multimedia and networking applications for multicore platforms, ii) power manager design for multiprocessor systems-on-chip. On-chip communication-aware power management strategies, iii) operating system for multiprocessors

- Wireless sensor networks, body area sensor networks for human-computer interface. Low-power MAC level protocols and routing algorithms for sensor networks. Energy scavenging for wireless sensor networks. Design of environmentally-aware power management infrastructure.

Publications

Journal papers:

1. E. Farella, A. Pieracci, A. Acquaviva, L. Benini, L. Rocchi (2008). Interfacing Human and Computer with Wireless Body Area Sensor Networks: The WiMoCA Solution. International Journal on MULTIMEDIA TOOLS AND APPLICATIONS, Springer, to be published, 2008.

2. A. Acquaviva, A. Alimonda, S. Carta, M. Pittau (2007). Assessing Task Migration Impact on Embedded Soft Real-Time Streaming Multimedia Applications. EURASIP JOURNAL ON EMBEDDED SYSTEMS (PRINT), 2007.

3. E. Farella, A. Acquaviva, L. Benini, B. Ricco' (2007). MOCA : A Low-Power, Low-Cost Motion Capture System Based on Integrated Accelerometers. Elsevier Internation Journal on ADVANCES IN MULTIMEDIA, 2007.

4. A. Acquaviva, G. De Micheli, Resource Management in Embedded MPSoCs: Is our Software Ready for It? System Design Frontiers, guest editorial, November 2007.

5. E. Farella, A. Pieracci, L. Benini, A. Acquaviva (2007). Inertial sensors for Wireless Body Area Networks: the WiMoCA Solution. ST JOURNAL OF RESEARCH, pp.97-117 Vol.4, 2007.

6. A. Susu, M. Magno, A. Acquaviva, D. Atienza, G. De Micheli, Exploration of Reconfiguration Strategies for Environmentally Powered Devices, Transactions on High-Performance Embedded Architectures and Compilers (Transactions on HiPEAC), Springer, 2007.

7. E. Lattanzi, E. Regini, A. Bogliolo, A. Acquaviva, Energetic Sustainability of Routing Algorithms for Energy-Harvesting Wireless Sensor Networks, Elsevier Computer Communications journal special issue (SI) on Network Coverage and Routing Schemes for Wireless Sensor Networks, Elsevier, 2006.

8. A. Acquaviva, A. Alimonda, L. Benini, A. Pisano, S. Carta, A Control Theoretic Approach to Energy Efficient Pipelined Computation in MPSoCs, ACM Transactions on Embedded Computing Systems, Special Issue on Languages, Compilers, and Tools for Embedded Systems, 2006.

9. A. Acquaviva, E. Lattanzi, A. Bogliolo, Power Aware Network Swapping for Wireless Palmtop PCs, IEEE Transactions on Mobile Computing, vol. 5, no. 5, pp. 571-582, 2006.

10. A. Acquaviva, T. Simunic, S. Roy, V. Deolalikar, Remote Power Control of Wireless Network Interfaces, Journal of Embedded Computing, issue 3, 2004.

11. E. Lattanzi, A. Acquaviva, A. Bogliolo and L. Benini, Exploring Coprocessor Interfaces in an Embedded Java Environment, WSEAS Transactions on Computers, vol. 2, no. 4, pp. 859-867, 2003.

12. A. Acquaviva, E. Lattanzi, A. Bogliolo and L. Benini, Dynamic Power Management of Streaming Applications over a Wireless LAN, WSEAS Transactions on Communications, vol. 2, no. 2-3, pp. 235-242, 2003.

13. A. Acquaviva, L. Benini, B. Ricco, Energy Characterization of Embedded Real-Time Operating Systems, ACM Computer Architecture News, vol. 29, no. 5 pp. 1318, December 2001.

14. A. Acquaviva, L. Benini, B. Ricco, Software-Controlled Processor Speed-Setting for Low-power streaming multimedia, IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, vol. 20, no. 11 pp. 12831292, November 2001.

Book chapters:

1. A. Acquaviva, L. Benini, A. Riccó, "Energy Characterization of Embedded Real-Time Operating Systems," Kluwer Academic Publishers (accepted).
2. L. Benini, A. Acquaviva, "Adaptive Algorithmic Power Optimization for Multimedia Workload in Mobile Environments", in *Handbook of Mobile Computing*, CRC press, 2004.
3. A. Acquaviva, E. Lattanzi, A. Bogliolo, "Power-Aware Network Swapping for Wireless Palmtop PCs," in *Ultra Low-Power Electronics and Design*, Kluwer Academic Publishers, 2004.
4. A. Acquaviva, E. Lattanzi, A. Bontá, "'Dynamic Power Management: The IEEE 802.11 Standard,"' in *Formal Methods for the Design of Computer, Communication and Software Systems: Mobile Computing*, SPRINGLER-VERLAG, 2005.
5. A. Acquaviva, A. Aldini, M. Bernardo, A. Bogliolo, E. Bonta', E. Lattanzi, "Assessing the Impact of Dynamic Power Management on the Functionality and the Performance of Battery-Powered Multimedia Appliances", in *Formal Methods for the Design of Computer, Communication and Software Systems: Mobile Computing*, SPRINGLER-VERLAG, 2005.
6. A. Acquaviva, E. Lattanzi, A. Bogliolo, Network Swapping, in *Formal Methods for the Design of Computer, Communication and Software Systems: Mobile Computing*, SPRINGLER-VERLAG, 2005.

Papers in International Conferences:

1. A. Acquaviva, R. Scarsi, "A Spatially-Adaptive Bus Interface for Low-Switching Communication", *IEEE International Symposium on Low-Power Electronics and Design*, August 2000.
2. A. Acquaviva, L. Benini, B. Ricco', "Processor Frequency Setting for Energy Minimization for Streaming Multimedia Application", *IEEE International Symposium on Hardware/Software Codesign*, April 2001.
3. A. Acquaviva, L. Benini, B. Ricco', "An Adaptive Algorithm for Low-Power Streaming Multimedia Processing", *IEEE Design, Automation and Test in Europe*, March 2001.
4. T. Simunic, L. Benini, A. Acquaviva, P. Glynn, G. De Micheli, "Dynamic Voltage Scaling and Power Management for Portable Systems", *IEEE Design Automation Conference*, April 2001.
5. B. Delaney, Nikil S. Jayant, M. Hans, T. Simunic, A. Acquaviva, "A Low-Power, Fixed-Point, Front-End Feature Extraction for a Distributed Speech Recognition System", *IEEE International Conference on Acoustic Speech and Signal Processing*, May 2002.
6. F. Gatti, A. Acquaviva, L. Benini, B. Ricco', "Low-Power Control Techniques for TFT LCD Displays," in *Proceedings of Compiler, Architectures and Synthesis of Embedded Systems*, October 2002.

7. A. Acquaviva, T. Simunic, V. Deolalikar, S. Roy, "Remote Power Control of Wireless Network Interfaces," in *Proceedings of PATMOS in Lecture Notes in Computer Science*, Springer-Verlag, September 2003.

8. A. Acquaviva, A. Bogliolo, "A Bottom-Up Approach for On-Chip Signal Integrity," in *Proceedings of PATMOS in Lecture Notes in Computer Science*, Springer-Verlag, Turin, September 2003.

9. A. Acquaviva, E. Lattanzi, A. Bogliolo, L. Benini, "A Simulation Model for Streaming Applications over a Power Manageable Wireless Link," in *Proceedings ofEuropean Simulation Conference*, October 2003.

10. A. Acquaviva, E. Lattanzi, A. Bogliolo, L. Benini, "Exploring Coprocessor Interfaces in an Embedded Java Environment," in *Proceedings ofInternational Conference on Simulation, Modelling and Optimization*, October 2003.

11. A. Acquaviva, E. Lattanzi, A. Bogliolo, L. Benini, "Dynamic Power Management of Streaming Applications over a Wireless LAN," *Proceedings ofInternational Conference on Simulation, Modelling and Optimization*, October 2003.

12. R. Barbieri, E. Farella, A. Acquaviva, L. Benini, B. Ricco', "A Low-Power Motion Capture System with Integrated Accelerometers," in *Proceedings of IEEE Consumer Communications and Networking Conference (CCNC)*, January 2004.

13. A. Acquaviva, E. Lattanzi, A. Bogliolo, "Power-Aware Network Swapping for Wireless Palmtop PCs," in *Proceedings of ACM/IEEE Design and Test in Europe Conference*, March 2004.

14. A. Acquaviva, A. Aldini, M. Bernardo, A. Bogliolo, E. Bonta', E. Lattanzi, "Assessing the Impact of Dynamic Power Management on the Functionality and the Performance of Battery-Powered Multimedia Appliances", *IEEE International Conference on Dependable Systems and Networks*, June 2004.

15. E. Lattanzi, A. Acquaviva, A. Bogliolo, "Run-Time Software Monitor of the Power Consumption of Wireless Network Interface Cards," in *Proceedings of Power and timing Modeling and Optimization and Simulation Conference*, Lecture Notes in Computer Science, Springer-Verlag, September 2004.

16. A. Acquaviva, E. Lattanzi, A. Bogliolo, "Designa and Simulation of Power-Aware Scheduling Strategies of Streaming Data in Wireless LANs," in *Proceedings of ACM conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems (MSWiM)*, Venice, October 2004.

17. E. Lattanzi, A. Acquaviva, A. Bogliolo, "Proximity Services Supporting Network Virtual Memory in Mobile Devices", in *Proocedings of ACM International Workshop on Wireless Mobile Applications and Services on WLAN Hotspots (WMASH)*, October 2004.

18. E. Farella, D. Brunelli, L. Benini, B. Ricc'ø, "'A Wearable Gesture Recognition System For Natural Navigation Interfaces,"' in *Proceedings of EUROSIS Euromedia Conference*, April 2005.

19. E. Farella, A. Pieracci, D. Brunelli, A. Acquaviva, L. Benini, B. Ricc, "Design and Implementation of WiMoCA Node for a Body Area Wireless Sensor Network", in *Proocedings of IEEE International Conference on Sensor Networks (SENET)*, August 2005.

20. M. Ruggiero, A. Acquaviva, D. Bertozzi, L. Benini, "'Application-Specific Power-Aware Workload Allocation for Voltage Scalable MPSoC Platforms"', in *Proceedings of International Conference on Computer Design*, October 2005.

21. S. Bertozzi, A. Acquaviva, A. Poggiali, D. Bertozzi, "'Supporting Task Migration in MPSoCs: A Feasibility Study,"' in *Proceedings of ACM/IEEE Design and Test in Europe Conference (DATE)*, 2006.

22. M. Spiga, A. Alimonda, S. Carta, F. Aymerich, A. Acquaviva. Exploiting Memory-Boundedness in Energy-Efficient Hard Real-Time Scheduling, IEEE IES, 2006.

23. A. Bogliolo, E. Lattanzi, A. Acquaviva. Energetic Sustainability of Environmentally Powered Wireless Sensor Networks, IEEE PE-WASUN, 2006.

24. A. Alimonda, S. Carta, A. Acquaviva, A. Pisano "Non-Linear Feedback Control for Energy Efficient On-Chip Streaming Computation"', IEEE IES, 2006.

25. A. Alimonda, A. Acquaviva, A. Pisano, S. Carta. "'A Control Theoretic Approach to Run-Time Energy Optimization of Pipelined Elaboration in MPSoCs,"' IEEE/ACM DATE, 2006.

26. E. Farella, A. Pieracci, L. Benini, A. Acquaviva (2006). A Wireless Body Area Sensor Network for Posture Detection , IEEE/ACM SENET, 2006.

27. I. Folcarelli, A. Acquaviva, A. Susu, T. Kluter, G. De Micheli (2006). An opportunistic reconfiguration strategy for environmentally powered devices" ACM Computing Frontiers, 2006.

28. S. Carta, A. Alimonda, A. Acquaviva, A. Pisano (2007). Queue-Based Runtime Energy Management for Heterogeneous Embedded Multicore Platforms,- Brasov (ROMANIA).

29. A. Alimonda, A. Acquaviva, A. Pisano, S. Carta, "'A Control Theoretic Approach to Run-Time Energy Optimization of Pipelined Elaboration in MPSoCs,"' in *Proceedings of ACM/IEEE Design and Test in Europe Conference (DATE)*, 2006.

30. M. Mantovani, S. Leardini, M. Ruggiero, A. Acquaviva, L. Benini (2007). A lightweight parallel java execution environment for embedded multiprocessor systems-on-chip IEEE/ACM GLSVLSI 2008.

31. M. Pittau, A. Alimonda, S. Carta, A. Acquaviva (2007). Impact of Task Migration on Embedded Streaming Multimedia for Embedded Processors, ACM ESTIMEDIA, 2007.

32. A. Nahapetian, P. Lombardo, A. Acquaviva, L. Benini, M. Sarrafzadeh (2007). Dynamic Reconfiguration in Sensor Networks with Regenerative Energy Sources, IEEE/ACM DATE 2007.

33. S. Carta, A. Acquaviva, P. G. Del Valle, D. Atienza, G. De Micheli, F. Rincon, L. Benini, J. M. Mendias. Multi-processor operating system emulation framework with thermal feedback for systems-on-chip, IEEE GLSVLSI, 2007.

34. S. Carta, A. Acquaviva, G. de Micheli. MIGRA: A Task Migration Algorithm for Reducing Temperature Gradient in Multiprocessor Systems-On-Chip, IEEE SoC, 2007.

35. Alexandru E. Susu, Andrea Acquaviva, David Atienza, Giovanni De Micheli (2008). Stochastic Modeling and Analysis for Environmentally Powered Wireless Sensor Nodes, IEEE WiOPT, 2008

36. Andrea Acquaviva, Franco Fummi, Giovanni Perbellini, Davide Quaglia. An Energy-Aware Co-Simulation Framework for the Design of Wireless Sensor Networks, IEEE/ACM GLSVLSI, 2008.

37. F. Mulas, S. Carta, M. Buttu, A. Acquaviva, D. Atienza, L. Benini, G. De Micheli. Thermal Balancing Policy for Streaming Computing on Multiprocessor Architectures, IEEE/ACM DATE, 2008.

Technical Reports:

1. A. Acquaviva, L. Benini, T. Simunic, "LP-ECOS: An Energy Efficient RTOS," *Hewlett-Packard Laboratories Technical Report*, HPL-2003-81.

2. A. Acquaviva, L. Benini, T. Simunic, "Server Controlled Power Management for Wireless Portable Devices," *Hewlett-Packard Laboratories Technical Report*, HPL-2003-82.

3. A. Acquaviva, L. Benini, T. Simunic,"A Low-Power, Fixed-Point Front-End Feature Extraction for a Distributed Speech Recognition System," *Hewlett-Packard Laboratories Technical Report*, HPL-2001-78.

Patents:

1. A. Acquaviva, L. Benini, T. Simunic, "Application-driven method and apparatus for limiting power consumption in a processor-controlled hardware platform," *Hewlett-Packard Laboratories*, no. 154-113.

2. A. Acquaviva, T. Simunic, "Power Management for Wireless Communications," *Hewlett-Packard Laboratories*, no. 200208421-1.

Internal publications:

1. A. Acquaviva, L. Benini, B. Riccó, "Software-Controlled Processor Speed Setting for Low-Power Streaming Multimedia," *ST Journal*, Novembre 2001.

Papers in Workshops:

1. A. Acquaviva, L. Benini, B. Ricco', "Software-Controlled Processor Speed Setting for low power streaming multimedia," *Symposium on Compiler and Operating Systems*, St.Goar, Germany, Mar. 2001.

2. A. Acquaviva, L. Benini, B. Ricco', "Energy Characterization of Embedded Real-Time Operating Systems," *Compilers and Operating Systems for Low-Power*, Barcelona, Spain, Sept. 2002.

Bologna, 5 May 2008.

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