

Dr.techn. Andrea Monacchi

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🔗 Industrial Orientation

Combining my experience in embedded systems, distributed computing and artificial intelligence: collecting, storing and analyzing large-scale streams from physical environments to optimize processes and automate daily tasks. The application field of specialty is electrical energy production and distribution.

🔗 Research Interests

Smart buildings & Microgrids (Demand-side management, Ambient-assisted living, Context-aware services), Distributed Artificial Intelligence (Multiagent decision making, Dependable Systems, Distributed Computing)

🔗 ML Methodologies

Neuroevolution, Temporal-difference learning, Decision trees and gradient-boosted ensembles

🏢 Industrial experience

IT Consultant (Data Science & Engineering), Data Reply GmbH (Reply AG), München, Germany

On-premise and cloud-based data science using the Hadoop/Spark and Kafka ecosystems July 2016 - Today

- Kafka connectors/sinks to push/pull data from Kafka topics
- Hadoop Map-Reduce and Interaction with HDFS-based data lake
- Definition of Oozie workflows to produce business reports using Hive queries and Map-Reduce jobs
- Spark jobs to periodically extract KPI/features and update statistical model, e.g. anomaly and fraud detection
- Spark Streaming processing from/to Kafka and HBase for real-time log analysis & event processing
- Kafka Streams based processing of Kafka topics (e.g. format conversion, extracting sessions on set-top-boxes)
- PySpark&Scikitlearn, e.g. predictive maintenance of power distribution network using Decision-tree ensembles
- Dockerized environments to run self-contained unit, integration and end-to-end tests on DS pipelines
- Worked under CI/CD philosophy using GitFlow and GitLabCI
- Worked in Agile teams across whole Germany, including Munich, Essen, Hamburg

IT Consultant (Energy Analytics), Power Reply GmbH (Reply AG), München, Germany

Extraction and Android-based provisioning of energy analytics for utilities Feb. 2016 - June 2016

- Event detection from outlet power data and performance assessment of industrial NILM component
- RESTful webservices with Java JEE/Spring (Boot/IoC, JPA/Hibernate/JPQL, etc.), PostgreSQL
- Visualization of energy usage at various time resolutions (MPCharts)
- Automatic reading of energy meters through OCR libraries (Anyline.io)
- Integration with SAP IS-U (tariff, invoicing) via REST/JSON services
- Geolocalization of partner offers, shown through augmented reality (PanicAR) and Google Map

Software Engineer, Townet Srl, Cagli, PU Italy

June - Sept. 2009

- Tested and deployed the Radius Server on Linux-based systems
- Developed web/intranet applications in PHP for internal management
- Assembled network devices (e.g., routers, CPEs, antennas)

Intern Technician, A.T.E. Elettronica Srl, Gubbio, PG Italy

July 2006

- Assembled and tested power supplies and automatic olive-oil dosers

Intern Web Developer, Lyn-x Snc, Gubbio, PG Italy

July - August 2004

- Designed web interfaces with Macromedia Fireworks and Flash MX
- Developed several websites in PHP and MySQL

⚗ Research experience

Researcher, Alpen-Adria-Universität Klagenfurt

Oct. 2015 - Jan. 2016

- Grant-supported research on power trading for Microgrids
- Dissemination and dissertation writing

Research assistant, Lakeside Labs, Klagenfurt, Austria

Smart Microgrid lab: establishment of a μ -grid experimental lab

Apr 2015 - August 2015

- Designed a Smart- μ Grid testbed for testing load-balancing algorithms
- Implemented event-driven architecture based on websockets, to remotely control electrical devices
- Deployed energy monitoring system at AAU, cut dev costs by 70% using open hw&sw

MONERGY: ICT solutions for energy saving in smart homes

Oct. 2012 - March 2015

- Gathered >1 year active power measurements at 1 Hz in Italy and Austria to analyze appliance usage

- Designed persuasive energy advisor potentially yielding 34% of energy savings
- Evolved neural controllers for optimization of renewable energy usage
- Designed ontology for device and data interoperability of household appliances

Student Researcher, CADIA lab, Reykjavík, Iceland Aug. 2011 - June 2012

Research on reinforcement learning and general game playing

- Designed context representation and reasoning framework
- Implemented TD-learning agent to provide early warning notifications
- Assessed the effectiveness of notifications and users' satisfaction, on real users

🎓 Education

Ph.D. in Informationstechnik - Information Engineering Oct. 2012 - Sep. 2016

Institute of Networked Embedded Systems, Smart Grid group

Alpen-Adria Universität Klagenfurt, Klagenfurt (Austria)

Focus on building energy management systems

Advisor: Wilfried Elmenreich

Meistaragráða í tölvunarfræði - M.Sc. in Computer Science Aug. 2011 - June 2012

Reykjavik University, Reykjavík (Iceland)

Focus on artificial intelligence and HCI

Advisor: Hannes Högni Vilhjálmsson

M.Sc. *cum Laude* in Computer Science Oct. 2010 - July 2012

University of Camerino, Camerino (Italy)

Focus on multi-agent and distributed systems

Advisor: Emanuela Merelli

B.Sc. *cum Laude* in Applied Computer Science Oct. 2007 - Oct. 2010

“Carlo Bo” University of Urbino, Urbino (Italy)

Focus on embedded systems and multimedia data processing

Technical High School in Electronics and Telecommunications Sept. 2002 - June 2007

I.T.I. “M. L. Cassata”, Gubbio (Italy)

🎓 Graduate courses

School of Energy Engineering - Aalborg Universitet (Denmark). Nov. 2012

PhD courses attended: “AC Microgrids” and “Power Quality in Microgrids”

🏆 Academic Honors

Italian Ministry of Education & Research	3k €	”Cooperlink”scholarship	2011
Camerino University	1.98k €	Erasmus scholarship	2011
Camerino University	0.75k €	Merit scholarship	2012
Marche Region (Italy)	2k €	MS Thesis award	2014
Alpen-Adria Universität Klagenfurt	6.51k €	Forschungsstipendium ¹	2015

📁 Computing Skills

<u>Languages</u>	Extensive knowledge	Java, Python, PHP3, XML, HTML, CSS, L ^A T _E X
	Intermediate knowledge	C, Bash shell, SQL, Ladder, VHDL, UML
	Basic knowledge	C++, Haskell, Javascript, R, Prolog
<u>Big Data Engineering</u>	Kafka, Kafka-connect, Kafka Streams, Hadoop, Spark, Spark Streaming, Oozie, Hive, Impala, HBase	
<u>Virtualization and Operations</u>	Ansible, Vagrant, Docker	
<u>DBMS</u>	MySQL, PostgreSQL, MongoDB	
<u>Artificial Intelligence</u>	Jade, Frevo, Protege, Neuroph	
<u>Data analysis</u>	Weka, libSVM, Netica, SPMF, Numpy/Matplotlib/Sympy/Pandas, Jupyter, Scikit-learn	
<u>M2M interoperability</u>	REST/JSON, Websockets/WAMP, CoAP, RDF/Sparql, XMPP, RabbitMQ	
<u>Versioning tools</u>	Gradle, Maven, SVN, Git	
<u>Graphic design</u>	Gimp, Adobe InDesign, Fireworks, SwishMax	
<u>3D Game Engines</u>	JMonkey, Panda 3D	
<u>Android</u>	GCM, GMaps, MPChart, SQLite, Realm.io, Retrofit, Butterknife, Glide, Anyline, PanicAR, Fabric.io	
<u>Operating systems</u>	ArchLinux, Debian/Ubuntu, MacOSX	
<u>Embedded OSes</u>	Contiki OS, FreeRTOS	
<u>Embedded systems tools</u>	Xilinx ISE, Mentor Graphics Modelsim, MPLab, AVRStudio	

¹Suspended for working reasons at the end of Jan. 2016

Project Management

Experience in leading projects and international teams (MS students and interns), Adaptability to new environments, Good communication skills, Research management (proposal and deliverable co-writing), Research methodology, Human-factors and research methods in HCI (A/B testing, usability, surveys), experience with Design Patterns and Agile processes (Scrum/XP), concerned on performance and documentation.

Languages

Italian (mother tongue), English (C1), German (B2/a²), Icelandic (A1³)

Activities

Released open-source projects (selected)

- DLM Sensitive, DLM Messenger, OpenMotion
- AcidRain game, WikiStar wiki
- Mjöltnir: the open-source energy advisor

Free time Photography, cooking, chess, painting, futsal, table soccer, hiking, horse riding

²Last examined level at AAU Klagenfurt in Jan 2015

³Last examined level at Reykjavik University in Dec 2011

Publications

Book chapters

- W. Elmenreich, A. Monacchi. Configuration and Management of Networked Embedded Devices, In Industrial Communication Technology Handbook, Second Edition, CRC Press, Boca Raton, FL 33431, USA, August 2014
- D. Egarter, A. Monacchi, M. Rabl-Pöchacker, K. Schweiger, B. Steinwender. Smart Grid: Visionen & Herausforderungen, In Energie - Interdisziplinäre Perspektiven auf eine knappe Ressource. Klagenfurter Interdisziplinäres Kolleg, pp. 15-53, 2014
- W. Elmenreich, T. Khatib, A. Monacchi. Smart Microgrids: Optimizing Local Resources toward Increased Efficiency and a More Sustainable Growth, In Research and Development Evolving Trends and Practices - Towards Human, Institutional and Economic Sectors Growth. InTech 2017.

Journals

- A. Monacchi, W. Elmenreich. Assisted Energy Management in Smart Microgrids. Springer Journal of Ambient Intelligence and Humanized Computing. 2016.
- A. Monacchi, F. Versolatto, M. Herold, D. Egarter, A. M. Tonello, W. Elmenreich. An Open Solution to Provide Personalised Feedback for Building Energy Management. IOS Journal of Ambient Intelligence and Smart Environments. 2016.
- D. Egarter, A. Monacchi, T. Khatib, W. Elmenreich. Integration of Legacy Appliances into Home Energy Management Systems. Journal of Ambient Intelligence and Humanized Computing. Springer. August 2015.
- A. Monacchi, S. Zhevzyk, W. Elmenreich. HEMS: A Home Energy Market Simulator. Computer Science - Research and Development. Springer. 2014.
- T. Khatib, A. Monacchi, W. Elmenreich, D. Egarter, S. D'Alessandro, A. M. Tonello. European end-user's level of energy consumption and attitude toward smart homes: A case study of residential sectors in Austria and Italy. Energy Technology & Policy, Taylor & Francis. 2014.

International workshops and conferences

- A. Monacchi, D. Egarter, W. Elmenreich. Integrating Households into the Smart Grid. In Proceedings of the IEEE Workshop on Modeling and Simulation of Cyber-Physical Energy Systems, Berkeley, CA, May 2013.
- A. Monacchi, W. Elmenreich, S. D'Alessandro, A. M. Tonello. Strategies for Domestic Energy Conservation in Carinthia and Friuli-Venezia Giulia. In Proceedings of the 39th Annual Conference of the IEEE Industrial Electronics Society (IECON), Vienna, Austria, 2013.
- A. Kercek, W. Elmenreich und A. Monacchi. Energieverbrauch in den Regionen Kärnten, Österreich und Friaul-Julisch-Venetien, Italien - Ein Vergleich. In 13. Symposium Energieinnovation. Graz, Austria, Februar 2014.
- S. D'Alessandro, A. M. Tonello, A. Monacchi, W. Elmenreich. Home Energy Management Systems: Design Guidelines for the Communication Infrastructure. In Proceedings of the IEEE International Energy Conference (ENERGYCON 2014). Dubrovnik, Croatia, May 2014.
- A. Monacchi, D. Egarter, W. Elmenreich, S. D'Alessandro, A. M. Tonello. GREEND: An Energy Consumption Dataset of Households in Italy and Austria. In Proceedings of the IEEE International Conference on Smart Grid Communications (Smart-GridComm 14). Venice, Italy, November 2014.

Posters & Demos

- A. Monacchi, W. Elmenreich. Insert-coin: turning the household into a prepaid billing system. In Proceedings of the 5th ACM Workshop on Embedded Systems for Energy-Efficient Buildings (BuildSys'13), Roma, Italy, 2013.

Theses

- A. Monacchi. Assisting Energy Management in Smart Microgrids and Buildings. PhD Thesis, Alpen-Adria-Universität Klagenfurt (Austria). June 2016.
- A. Monacchi. An Early Warning System for Ambient Assisted Living. MSc Thesis, Reykjavik University (Iceland) and Università degli studi di Camerino (Italy). June 2012.
- A. Monacchi. Analisi di un sistema operativo per dispositivi a memoria limitata: applicazione alla misurazione di parametri ambientali. BSc Thesis, Università degli studi di Urbino "Carlo Bo" (Italy). October 2010.