


PERSONAL INFORMATION

Berardo Naticchia

 Department of Civil, Building, Engineering and Architecture – DICEA



POSITION

Full Professor of Building Engineering

Chief of Digital Management for Construction Research Centre at Polytechnic University of Marche

Italian Dean of “Building Construction Management” Academic Discipline (ICAR/11)

President of Italian Society of Science, Technology and Engineering of Architecture (Scientific Society of ICAR/11 Academic Discipline)

WORK EXPERIENCE

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- From 2001 to present **Full Professor**
Department of Architecture Construction and Structures of Polytechnic University of Marche
- From 1997 to 2001 **Associate Professor**
Department of Architecture Construction of Polytechnic University of Marche
- From 1990 to 1997 **Assistant Professor**
Building Technology Institute of University of Ancona
- From 1988 to 1990 **Researcher**
Istituto dell'Enciclopedia Italiana Treccani

EDUCATION AND TRAINING

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- 1989 **Civil engineering trade certification**
- 1988 **Master of Science degree in Civil Engineering**
University of Ancona with full marks and honours discussing a dissertation on “Modelling the vapour and liquid moisture transfer through porous construction materials”

RESEARCH INTERESTS AND ACTIVITIES

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- Research Interests**
- Digital innovation and automation in construction industry aiming to develop approaches and technologies for digital aided lean product design and lean construction/operations management. In this field specific investigations have been focused on: Advanced decision support tools for performance forecasting and real time management, Pervasive real time sensing technologies for construction monitoring with particular aim to safety management, Development of new generation of cyber physical construction machinery

- Smart Technologies for building systems, aiming to develop high performance facilities capable of integrating and optimizing energy efficiency, durability, life-cycle performance, and occupant productivity. In this field specific investigations have been focused on: dynamic energy-behaviour building components and predictive modelling for optimal management of building services.

Main Keywords of Research Interest:

- Building project management
- Lean Construction
- Building Information Modelling
- Automation in Building and Construction
- Architectural technology
- Construction management
- Safety Management

RESEARCH PROJECTS and FUNDING

National and International Research Projects

- Principal Investigator of the Research Program “A Distributed Digital Collaboration Framework for Small and Medium-Sized Engineering and Construction Enterprises” grant: Progetti di Ricerca di Rilevante Interesse Nazionale PRIN 2018-2020
- Assistant Investigator in European Research Program: “ENergy aware BIM Cloud Platform in a COst-effective Building RENovation Context - ENCORE” : H2020-EU.2.1.5.2, Grant agreement ID: 820434 - 1 January 2019 - 30 June 2022.
- Research Unit Coordinator in the Research Program “Private Assisted House for the active and independent longevity of the elderly (Pass)” Call for the development of integration platforms dedicated to active aging and ambient assisted living Regione Marche (DGR 1464 7/11/2011) Det. 381/DGEN del 20/12/2012 2012-2014
- Principal Investigator of the Research Program “A proactive support system for real time health & safety management in construction sites” grant: Progetti di Ricerca di Rilevante Interesse Nazionale PRIN 2008-2010
- Principal Investigator of the Research Program “S.L.A.C. Support System for safety management in workplaces subject to relevant hazards” MIUR industrial research and experimental development support program DM 13/10/08 2008 – 2011
- Principal Investigator of the Research Program “Argos: A proactive system for the safety management in construction sites” grant: Supporting the development of new innovative academic spin off companies” Regione Marche # 1.3.1.07.01” 2007-2009
- Assistant Investigator in Research Program: “MACE Metadata for Architectural Contents” :EU eContentplus Programme, EU Commission Contract Number ECP 2005 EDU 038098: 2006-2009.
- Assistant Investigator in Research Program: “WINDS – Web based Intelligent Design Tutoring System”, EU FP 5 - IST Program, EU Commission Contract Number IST-1999-10253,” 2000-2004.
- Research Unit Coordinator in the Research Program “IDEF Modelling for Building lifecycle Management” grant: Progetti di Ricerca di Rilevante Interesse Nazionale PRIN 2003-2005
- Assistant Investigator in Research Program: “C-TIDE Changeable Thermal Inertia Dry Enclosures” EU FP 5 - CRAFT Program, EU Commission Contract Number CRAFT 1999-70706: 2003-2004.
- Research Unit Coordinator in the Research Program “Modelling Building Pathologies using Bayesian Networks” grant: Progetti di Ricerca di Rilevante Interesse Nazionale PRIN 1999-2001

Local Academic Research Projects

- “Digital twin for safety management” Marche Polytechnic University grant 2020
- “BIM-based safety management system “ Marche Polytechnic University grant 2019
- “Mixed Reality system form Construction Management” Marche Polytechnic University grant 2018
- “Development of Agent based Simulation Models for Lean Management in Construction” Marche Polytechnic University grant 2017
- “BIM based modelling for safety management” Marche Polytechnic University grant 2016
- “Bayesian Modelling of building energy behaviour” Marche Polytechnic University grant 2015
- “Experimental estimate of air infiltrations in buildings by measuring the decay of carbon dioxide” Marche Polytechnic University grant 2014
- “Development of models for automatic recognition of activities for Ambient Assisted Living” Marche Polytechnic University grant 2013

- “High Automation Building technologies for Ambient Assisted Living” Marche Polytechnic University grant 2012
- “Home automation system supporting elderly care” Marche Polytechnic University grant 2011
- “Sensors Integration for proactive buildings” Marche Polytechnic University grant 2010
- “Development of advanced models for real-time detection of risks in construction sites” Marche Polytechnic University grant 2009
- “Automated and integrated system for advanced emergency management in hospitals” Marche Polytechnic University grant, 2008.
- “Development of a robotic end tool for automatic plastering of walls” Marche Polytechnic University grant, 2007.
- “Optimization of actuator and sensor arrays to control the vibration and acoustic behaviour of building glazed facades” Marche Polytechnic University grant, 2006.
- “Acoustic Structural Active Control of light building enclosures” Marche Polytechnic University grant, 2005.
- “The use of Laser Doppler Vibrometry in surveying of historic building masonry” Marche Polytechnic University grant, 2004.
- “Characterization of Ground Penetrating Radar imaging for technical inspection of buildings” Marche Polytechnic University grant, 2003.
- “Innovative rehabilitation technique of wood beams using FRP composite reinforcements” Marche Polytechnic University grant, 2002;
- “Innovative rehabilitation technique of brick vaults using sprayed FRP composite materials” Ancona University grant, 2001;

PUBLICATIONS and PATENTS

Author/co-author of over 120 international titles including ISI listed journal papers, Book chapters, Monographs and Conference Papers and co-author of 3 industrial Patents.

Selected papers on scientific journals from 2010 to 2019

- Naticchia, B. Giretti, A.; Corneli, A. A Decision Support System for Scenario Analysis in Energy Refurbishment of Residential Buildings. *Energies* 2021, 14, 4738. <https://doi.org/10.3390/en14164738>
- B. Naticchia, A. Carbonari, M. Vaccarini, R. Giorgi (2019). Holonic execution system for real-time construction management. *AUTOMATION IN CONSTRUCTION*, vol. 104, p. 179-196, ISSN: 0926-5805, doi: 10.1016/j.autcon.2019.04.018
- Ulpiani, Giulia, Benedettelli, Mariangela, di Perna, Costanzo, Naticchia, Berardo (2017). Overheating phenomena induced by fully-glazed facades: Investigation of a sick building in Italy and assessment of the benefits achieved via model predictive control of the AC system. *SOLAR ENERGY*, vol. 157, p. 830-852, ISSN: 0038-092X, doi: 10.1016/j.solener.2017.09.009
- Marco Cecchi, NATICCHIA, BERARDO, CARBONARI, Alessandro (2014). Development of a first prototype of a liquid-shaded dynamic glazed facade for buildings. *PROCEDIA ENGINEERING*, vol. 85, p. 94-103, ISSN: 1877-7058
- B. Naticchia, G. Fava, A. Carbonari, E. Quaquero (2014). Preliminary tests on a wireless sensor network for pervasive dust monitoring in construction sites. *THE OPEN ENVIRONMENTAL ENGINEERING JOURNAL*, vol. 7, p. 10-18, ISSN: 1874-8295
- NATICCHIA, BERARDO, VACCARINI, Massimo, CARBONARI, Alessandro (2013). A monitoring system for real-time interference control on construction sites. *AUTOMATION IN CONSTRUCTION*, vol. 29, p. 148-160, ISSN: 0926-5805
- Berardo Naticchia, Alessandro Carbonari (2013). Advanced technologies for supporting health and safety in construction management. *IN BO*, vol. 4, p. 47-60, ISSN: 2036-1602
- CARBONARI, Alessandro, Fioretti R., NATICCHIA, BERARDO, PRINCIPI, Paolo (2012). Experimental estimation of the solar properties of a switchable liquid shading system for glazed facades. *ENERGY AND BUILDINGS*, vol. 45, p. 299-310, ISSN: 0378-7788
- VACCARINI, Massimo, NATICCHIA, BERARDO, A. Casolaro, CARBONARI, Alessandro (2012). Ultra-pervasive district monitoring for water leak detection. *GERONTECHNOLOGY*, vol. Vol. 11(2), 2012, ISSN: 1569-1101
- CARBONARI, Alessandro, GIRETTI, ALBERTO, NATICCHIA, BERARDO (2011). A proactive system for real-time safety management in construction sites. *AUTOMATION IN CONSTRUCTION*, vol. Vol. 20, p. 686-698, ISSN: 0926-5805
- NATICCHIA, BERARDO, D'ORAZIO, Marco, CARBONARI, Alessandro, PERSICO I. (2010). Energy performance evaluation of a novel evaporative cooling technique. *ENERGY AND BUILDINGS*, vol. 42(10), p. 1926-1938, ISSN: 0378-7788

Author/co-author of over 120 international titles including ISI listed journal papers, Book chapters, Monographs and Conference Papers.

Selected chapters on scientific volumes from 2010 to 2019

- COSTANTINI, MAURIZIO, Berardo Naticchia (2017). Systems Engineering in Geriatric Surgery: The Contribution of Modeling and Simulation.. In: Gabriella Bettelli. Perioperative Care of the Elderly, Clinical and Organizational Aspects. vol. 1, p. 336-341, CAMBRIDGE:Cambridge University Press, ISBN: 9781107139343, doi: 10.1017/9781316488782
- CARLONI, MIRKO, D'APARO, ROCCO DAVIDE, SCORRANO, PIERPAOLO, NATICCHIA, BERARDO, CONTI, MASSIMO (2016). State of charge monitor for wireless sensor networks. In: Lecture Notes in Electrical Engineering. vol. 392, p. 65-78, Springer Verlag, ISBN: 9783319396989, doi: 10.1007/978-3-319-39700-9_6
- CARBONARI, Alessandro, NATICCHIA, BERARDO, D'ORAZIO, Marco (2015). Innovative evaporative cooling walls. In: F. Pacheco-Torgal J. A. Labrincha L. F. Cabeza and C. G. Granqvist. Eco-efficient Materials for Mitigating Building Cooling Needs. p. 215-240, Amsterdam:Woodhead Elsevier, ISBN: 978-1-78242-380-5
- Giretti A., Naticchia B., Lemma M. (2013). Information and automation technologies for intelligent buildings. In: ICT, Automation and the Industry of the Built Environment: from the Information Exchange to the Field Management. p. 229-243, Maggioli, ISBN: 9788838762581
- Alberto Giretti, Alessandro Carbonari, Berardo Naticchia (2012). A Spatio-Temporal Bayesian Network for Adaptive Risk Management in Territorial Emergency Response Operations. In: Wichian Premchaiswadi. Bayesian Networks. p. 49-70, InTech, ISBN: 9789535105565
- Giretti A., Carbonari A., Novembri G., Naticchia B. (2012). Increasing competitiveness of construction companies through automation technologies. In: ISTeA - Italian society of science, technology and engineering of architecture. The missing brick: towards a 21st century Built Environment Industry. p. 449-468, Segrate (Milano):Maggioli Editore, ISBN: 8838761647
- Vaccarini M., Naticchia B., Carbonari A., Scorrano P. (2012). Real-time diagnosis for building structural monitoring. In: ISTeA - Italian society of science, technology and engineering of architecture. The Missin Brick: towards a 21st century Built Environment Industry. p. 410-428, Segrate (Milano):Maggioli Editore, ISBN: 8838761647
- Naticchia B., Vaccarini M., Robuffo F., Casolaro A. (2012). Ultra-pervasive monitoring system for water leaks. In: The Missing Brick: towards a 21st century Built Environment Industry . p. 429-448, Segrate (Milano):Maggioli, ISBN: 8838761647
- NATICCHIA, BERARDO, VACCARINI, Massimo, CARBONARI, Alessandro, SCORRANO, PIERPAOLO (2011). Auto-regressive compensation technique for a reliable non invasive structural health monitoring system. In: Proceedings (Part 2) of ISARC 2011. vol. 2011, p. 220-225, Seoul:Secretariat PEOPLE-X, Inc., ISBN: 9788995457238
- Giretti A., Carbonari A., Vaccarini M., Robuffo F., Naticchia B. (2011). Interoperable approach in support of semi-automated construction management. In: Proceedings (Part 1) of ISARC 2011. vol. 2011, p. 266-271, Seoul:Secretariat PEOPLE-X Inc., ISBN: 9788995457238
- CARBONARI A., BISCOTTI A., NATICCHIA B., ROBUFFO F., DE GRASSI M. (2010). A management system against major risk accidents in large construction sites. In: Proceedings of 27th International Symposium on Automation and Robotics in Construction (ISARC). p. 223-232, Brno:Tribun EU, ISBN: 9788073999742
- NATICCHIA B., GIRETTI A., CARBONARI A., VACCARINI M. (2010). A real-time and non intrusive structural health monitoring system for buildings. In: -. Proceedings of 27th ISARC. p. 223-232, Brno:Kamil Irbis Tribun EU, ISBN: 9788073999742
- NATICCHIA B., CARBONARI A. (2010). Causal modelling based on bayesian networks for preliminary design of buildings. In: AHMED REBAI. Bayesian Network. p. 293-316, Rijeka, Croatia:Sciyo, ISBN: 9789533071244
- CARBONARI A., NATICCHIA B., TOSI G., CONTI C. (2010). Design and Development of a Smart Window for Solar Control of Glazed Facades. In: -. CESB 2010 "Central Europe towards Sustainable Building". p. 247-250, Prague:Tiskarna PROTISK, ISBN: 9788024736341
- CARBONARI A., NATICCHIA B. (2010). Switchable liquid shading system for smart windows. In: -. The Proceedings of the 41st congress on HVAC&R. p. 126-136, Belgrade:Smeits, ISBN: 9788681505557

AWARDS

- 2019 Best Paper Award European Conference of Computing in Construction (EC3)
- 2010 Best Paper Award International Symposium on Automation and Robotics in Construction (ISARC).
- 2005 Scientific Research award funded by the Polytechnic University of Marche: 1st classified for the Civil and Architecture Area.

TECHNOLOGY TRANSFER

Co-founder and CEO of 3 innovative start-up companies as academic spin-off of Marche Polytechnic University

- 2003 Artemis Ltd: Exploits research and development of innovative non-destructive diagnostic techniques in the field of building, civil structures and Cultural Heritage, in particular taking advantage of exclusive Laser-Doppler vibrometry analysis developed for the detection of deep cracks in building and structural elements. Artemis delivers services for detection of the vibrational behavior of building and structural elements with laser-Doppler vibrometry, thermographic analysis, ground penetrating radar surveying techniques, magnetometric analysis, carbonation tests on concrete phenolphthalein, ultrasound concrete analysis.
- 2007 PCQ Ltd: Institute for certification and quality branding for products and services for construction, operates in compliance with international, European and Italian standards which regulate the activities of certification bodies. The start-up initial mission to spread a culture of quality in the construction industry has expanded over time to services for construction in general, taking into account the changing legal and market trends and developments, which tend towards improved quality of life, environmental protection and lower consumption of resources.
- 2008 SmartSpace Solutions Ltd: Exploits Internet of Things and ICT innovation to enable digital collaboration for engineering and construction projects. SmartSpace develops integrated solutions targeted to support real-time lean management by capturing and computing information with exclusive patented pervasive sensing and site intelligence technologies. On the other hand SmartSpace develops advanced technologies enabling cognitive buildings and ambient assisted living.

CONSULTANCY ACTIVITY

Intense activity of quality inspection and technical designs approval has been carried-out within the "Inter University Centre Progetto Costruzione Qualità". Among important experiences can be cited the Inspections and technical design approval of:

- Auditorium of Ravello Architect Oscar Niemeyer.
- New Building of Faculty of Law in Turin Architect Norman Foster.
- Metro Train Station in Scandicci: Architect Richard Rogers.
- New Building of Polytechnic of Turin, Architect Vittorio Gregotti,
- Papa Giovanni XXIII Hospital in Bergamo, Architect Aymeric Zublena

Consultant for projects evaluation: he evaluated research projects for several Italian and European Universities and Research Centres.

Consultant in legal actions: he has been expert consultant of Public prosecutor's office or President of Court in several important legal actions.

TEACHING EXPERIENCE

- Graduate courses** Since 1991 his teaching activities have been carried out in the following courses of Building engineering graduate programs:
- 2014 – present: "Project Engineering for Building Construction", Building Engineering degree at Marche Polytechnic University
 - 2004 – 2005: "Building diagnostics", Building Engineering degree at Marche Polytechnic University
 - 2002 – 2003: "Technology and Experimental Prototyping", in Design degree course at Milan Polytechnic
 - 2002-2004: "Project Management", Building Engineering degree at Marche Polytechnic University
 - 1999 – 2004: "Detail Design of Buildings", Building Engineering degree at Marche Polytechnic University
 - 1994 – present: "Building Construction Management", Building Engineering degree at Marche Polytechnic University
 - 1991 – 1993: "Technology of Building Systems", Civil Engineering degree at University of Ancona

In his academic career, he has been tutor of over 120 master's theses.

- PhD courses** In the last 20 years he has been member of the following PhD program boards:

- 2014 – present “Civil, Environmental, Building and Architecture Engineering”
- 2010 – 2013 “Architecture Buildings and Structures”
- 2001 – 2009 “Engineering Architecture and Economics for the Sustainability of Urban and Rural Environment”
- 2001 – 2006 “E-Learning: methods and techniques for computer-assisted education”
- 1997 – 2000 “Design Analytical Techniques for Building Engineering”

In the same period he has been tutor of 16 doctoral theses.

Post-Graduate Master

- 2020: Post-Graduate Master in “Building Information Modeling and Safety in Construction”
- 2014: Post-Graduate Master in “Safety Management in Construction” at the Marche Polytechnic University
- 2007: Post-Graduate Master in “Building Construction Management” at Padua University
- 2005: Post-Graduate Master in “Environmental Safety Engineering and relevant risks prevention” at the Marche Polytechnic University

SCIENTIFIC SOCIETY POSITIONS

Co-founder and Board Member of the “Italian Society of Technology and Engineering for Architecture”.
Co-founder, Member of Board of Directors of “Inter-University Centre Progetto Costruzione Qualità” founded by Marche Polytechnic University, Polytechnic of Milan and Polytechnic of Turin with the mission of spreading the culture of quality in the building construction industry.

Member of the “Active House Alliance” which promotes standards and practices for design and construction of buildings that create healthier and more comfortable lives for their occupants without negative impact on the climate.

He collaborates as Reviewer with “Automation in Construction Journal” Elsevier, “Energy and Buildings Journal” Elsevier and “Building and Environment Journal” Elsevier.

ADMINISTRATIVE SERVICES

- 2020 Coordinator of Post-Graduate Master in “Building Information Modeling and Safety in Construction”
- from 2001 to 2011 President of Building Engineering Course Council of the Marche Polytechnic University.
- from 1997 to 2001 Committee for the recruitment of new Professors at the Faculty of Engineering of the Marche Polytechnic University