Marco Ferretti

AFFILIATION
Dipartimento di Ingegneria Industriale e dell'Informazione (DIII)
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EDUCATION

1979 Laurea (cum laude) Electronics Engineering
University of Pavia

ACADEMIC POSITIONS

1994 Full Professor in Computer Architecture
University of Pavia - DIS
1991 Associate Professor (tenured)
University of Pavia - DIS
1988 Associate Professor
University of Pavia - DIS
1983 Assistant Professor
University of Pavia - DIS
1981 Data Base Consultant
Syntax (OLIVETTI)
1979 Contract Researcher
Cybernetics and Biophysics Unit - C.N.R.

MANAGEMENT POSITIONS

since 2011 C.I.N.E.C.A. Advisory Board (Consulta)
since 2006 C.I.N.I. Board of Directors and Executive Committee
since 2004 C.I.N.E.C.A. Board of Directors, later Representative of the Rector
since 2001 ECDL Test Site Manager, University of Pavia
2004-2016 C.I.N.I EUCIP National Project manager
2013-2015 A.I.C.A Scientific Commitee
2004-2016 EUCIP Program Development Board, ECDL Foundation
2001-2013 C.I.L.E.A Scientific Advisory Board
2001-2007 University of Pavia, Director of the Board, Central Computing Facilty

DIDATTIC ACTIVITIES

2009 - 2012 Chair. Consiglio Didattico Classe Ingegneria dell'Informazione
2000 - 2009 Chair, Corso di Laurea Ingegneria Informatica, University of Pavia

Courses Taught
Introduction to Data Base Management Systems (Univ. Pavia)
Advanced Computer Architectures (Univ. Pavia)
Multimedia Publishing (Int. Master on Media, Science & Technology,
Univ. Pavia & Univ. Tunis)

SCIENTIFIC ACTIVITIES

Professional Societies
Member, IEEE
Fellow, IAPR (International Association for Pattern Recognition)
Chairman, IAPR Technical Committee on Special Purpose
Architectures for Image Processing and Computer Vision
President GIRPR (IAPR Italian Chapter) 2004-2008
Committees (excerpt)
Program Committee, 12th ICPR, 1994
Program Committee, CAMP 95, 97, MVA, ICIAR
Vice Chair, 6th Int. Conf. Image Analysis and Processing (ICIAP)
Chairman, 11th Int. Conf. Image Analysis and Processing
Steering Committee, ICIAP

Reviewer activities (excerpt) for:

IEEE Transaction on Signal Processing
Pattern Recognition
Journal of Visual Languages and Computing
Vision, Image and Signal Processing
Signal Processing
European Transactions on Telecommunications
Cahier de la Recherche

CONSULTANCY ACTIVITIES.

2016. Member of the selection panel in the tender by **FondDirigenti** for "Procedura aperta per l'affidamento dei servizi di sviluppo, manutenzione e gestione del Sistema Informativo di Fondirigenti Denominato SIF, Codice identificativo gara (CIG) 61016844EC"

2015-2016. Member of the selection panel in the tender by **CINECA** for 22 M€ "GARA1505 - SISTEMA DI SUPERCALCOLO DI CLASSE TIER-0, CIG 61517096DB, CUP D89J14001490005
Numero Gara A.N.AC. 5949867 - CIG 61517096D"

1999-2000. Consultancy and Service agreement between "**Regione Lombardia**" and "Università degli Studi di Pavia" for the definition and the design ao an integrated data base, to be used as a first ICT support to the "Sportello unico per le imprese".

Ottobre 1999. Consultancy to "**Prefettura di Pavia**". Technical assessment on the "Progetto architetturale per la realizzazione di un sistema distribuito ed integrato di servizi tra Prefettura di Pavia ed altri Uffici Pubblici". Interoperability of IS among "Prefetture".

1994-1995. Member of the selection panel in the tender by "**Comune di Mantova**" for "Appalto Concorso per l'automazione dei servizi del Comune di Mantova".

MAJOR PROFESSIONAL PROJECTS

ICT competency framework, eCF. Since 2011, he is tracking the set-up of the EU e-Skills initiative and the evolution of the eCF (European e-Competence Framework) proposed by CEN through CWAs (CEN Workshop Agreements) currently at its 3.0 version. Since 2014, he is leading the **C.I.N.I. National laboratory CFC "Competenze digitali, formazione e cerificazione",** that carries out a research activity on e-competences schemes, academia curricula and marketplace ICT labour requirements. In this capacity, he represents CINI within the UNI UNINFO committee that drafted the UNI 11506/2013 rule "Attività professionali non regolamentate - Figure professionali operanti nel settore ICT - Definizione dei requisiti di conoscenza, abilità e competenze". Recently (2014), he lectured on these subjects for the DG Enterprise fundend projects "E.leadership initiative" and the "ICT Body of Knowledge".
During 2014 he represented CINI at the "**Tavolo di coordinamento**" set up by **AGID** for the "Programma nazionale per la Cultura, la formazione e le competenze digitali", and also at the focus group on "Competenze di e-leadership".
Since 2016, he leads CINI CFC participation in the "Osservatorio delle Competenze Digitali", an initiative of ASSINFRON, ASSINTEL, ASSINTER, AICA, with support from AGID, to analyze the ICT market place and the supply/demand balance of ICT professionals.
He has served as expert in many EU led initiative in the ICT professionalism, among which the e-Skills project led by Empirica on "E-Leadership", and the "ICT Professionalism Framework" project commissioned to E&Y, CapGemini and IDC.

EUCIP Professional Scheme and University curricula. From 2004 to 2011, he managed a nation-wide project led by C.I.N.I. to study the connections between professional profiling schemes with associated vendor independent certifications, and university curricula in ICT. C.I.N.I has worked on the EUCIP scheme, and in the years 2004-2007 has analysed in detail Computer Engineering and Computer Science tracks (at the bachelor level, a three-year degree) with respect to the so called CORE level syllabus of competences, as specified by the EUCIP scheme. The project has highlighted the intersections and the differences, both in coverage and depth. Experimental e-learning courses have been designed to fill in the gaps highlighted by the analysis of university curricula, especially in the competence areas of the use of ICT methods and tools in the management of business within companies and organizations. The projects has been extended in 2008-2009, with the aim of assessing the coverage of professional profiles as specified by the so called EUCIP Elective scheme in university master tracks (two-year degree).

MAJOR RESEARCH ACTIVITIES

Bioinformatics and Massively Parallel Processing. Development of paralleization strategies for Bioinformatics applications on massively parallel processing systems such as IBM Blue Gene/Q. Main focus is on the study of the 3D structures of proteins and of the composition of the molecular structure by *secondary structures*.

Massively Parallel Pyramidal Computer Systems. This work has lead to the design, construction and verification at the prototype stage of a multi-processor system for vision and image processing, based on a hierarchical topology, the so-called pyramid, known as PAPIA (Pyramidal Architecture for Parallel Image Analysis). Such a system allows to efficiently process images in a multi-resolution mode. It is based on a semi-custom chip embedding a small pyramid of 5 elementary processors. An enhanced version of the system has also been design. The pyramid is mapped logically in a specialized bi-dimensional array with 8-connectivity mesh topology. The chip contains an array of 128 elementary processors.
The project was partly funded by E.N.E.A.

ASIC for Object Recognition. The detection and localization of bi-dimensional shapes in images for industrial inspection has been addressed with a dedicated approach, to cope with the stringent time requirement of many inspection tasks. A chip-set for the Generalized Hough transform is the outcome of a long term research activity, sponsored by C.N.R.

Image compression. A dedicated solution for very simple hardware devices to compress still images was obtained with a peculiar implementation of the Haar transform. This solution leads to compression ratios at least as good as those obtained by using the cosine transform within the JPEG framework, but at a much smaller cost, in term of silicon area.

E-learning and Artificial Intelligence. This activity is centred around the exploitation of knowledge representation methods to enhance e-learning material construction and validation. By leveraging on ontology-based domain knowledge representation, a system has been set-up to assess teaching material with respect to a syllabus-based description. With further profiling, the system is able to infer and construct personalized e-learning courses by assembling them from a catalogue of semantically annotated learning objects.

MOST RELEVANT PUBLICATIONS SINCE 2008.

M. Ferretti, N. Scarabottolo, “The University Approach to EUCIP”, Upgrade, Vol. IX, N. 4, August 2008, pp. 20-26, www.upgrade-cepis.org.

M. Ferretti, J. Oruaas, “E-learning Tools and Project on EUCIP Core”, Upgrade, Vol. IX, N. 4, August 2008, pp. 55-66, www.upgrade-cepis.org.

M. Ferretti, “The EUCIP Scheme in the Italian University System” , in E-Governemnt, ICT Professionalism, Service Science, (R. Bellini, G. Motta, N, Mazzeo eds.), pp 139-148, Springer Verlag, 2008.

M Ferretti, “ICT Professional Profiles and Certifications in the Italian University System – the Eucip Case”, in ICT Skills, Education and certificationn, The Multi-stakeholder Partnership, 27-28 Nov 2009, Rome, IT STAR Series, G. Occhini and P. Nedkov Eds., pp. 95-105, Editrice Bibliografica, 2010.

D. Bartocci, F. Ferretti, “Handling Complex Events in Surveillance Tasks”, Proc. 16nth Int. Conf. Image Analysis and Processing (ICIAP 2011), Ravenna, Sept. 2011, pp. 99-108, LNCS 6979, Springer (Berlin), 2011.

M. Ferretti, M. Musci, “Parallelism in Embedded Multimedia Frameworks: an assessment,” in Atti del 6sto Convegno Nazionale del Gruppo Italiano Ricercatori in Pattern Recognition, Pontignano (Siena), 21-23 Maggio 2012, pagine 12.

M. Ferretti, M. Musci, “Entire Motifs Search of Secondary Structures in Proteins: a Parallelization Study”, Proc. Pbio 2013 Intern. Workshop on Parallelism in Bioinformatics, Sept. 17, 2013 (Madrid), pp.199-204, ACM, New York, NY, USA, ISBN: 978-1-4503-1903-4, doi10.1145/2488551.2488580, 2013.

G. Drago, M. Ferretti, M. Musci, “CCMS: A Greedy Approach to Motif Extraction,” Proc. PR PS BB PR PS BB - Pattern Recognition in Proteomics, Structural Biology and Bioinformatics, Naples, 9-10 Sept, in “New Trends in Image Analysis and Processing – ICIAP 2013”, LNCS 8158, Springer (Berlin), ISBN 978-3-642-41189-2, doi 10.1007/978-3-642-41190-8, 2013.

M. Ferretti, M. Musci, L. Santangelo. *A hybrid OpenMP and OpenMPI approach to geometrical motif search in proteins*. In Proceedings of the IEEE International Conference on Cluster Computing (IEEE Cluster 2014), IEEE Computer Society, Madrid, Spain, September 2014, pp. 298-304. ISBN: 978-1-4799-5547-3.

V. Cantoni, M. Ferretti, N. Pellicanò, J. Vandoni, M. Musci, N. Nugrahaningsih. *Protein Motif Retrieval by Secondary Structure Element Geometry and Biological Features Saliency*. In Proceedings of the IEEE DEXA 25th International Workshop on Biological Knowledge Discovery and Data Mining (BIOKDD'14), Munich, September 2014, pages 23-26.

M. Ferretti, M. Musci, “Geometrical Motifs Search in Proteins: A Parallel Approach,” *in Parallel Computing*, (2014), http://dx.doi.org/10.1016/j.parco.2014.09.007

M. Ferretti, M. Musci, L. Santangelo, “MPI-CMS: a hybrid parallel approach to geometrical motif search in protein”, Concurrency and Computation: Practice and Experience 27 (18), 5500-5516, 2015, published online, DOI: 10.1002/cpe.3588.

F. Auricchio, M. Ferretti, A. Lefieux, M. Musci, A. Reali, S. Trimarchi, A. Veneziani, “Assessment of a black-box approach for a parallel finite elements solver in computational hemodynamics,” Proc. 2015 IEEE Trustcom/BigDataSE/ISPA, pp. 202-207, DOI 10.1109/trustcom.2015.633, 2015.

V. Cantoni, M. Ferretti, M. Musci, N. Nugrahaningsih. Structural Motifs Identification and Retrieval: A Geometrical Approach. In "Pattern Recognition in Computational Molecular Biology: Techniques and Approaches", 1st edition. Mourad Elloumi, Costas S. Iliopoulos, Jason T. L. Wang and Albert Y. Zomaya eds., pp. 129-154, ISBN 978-1-118-89368-5, Wiley, 2016.

F. Auricchio, M. Ferretti, A. Lefieux, M. Musci, A. Reali, S. Trimarchi, A. Veneziani, “Parallelizing a finite element solver in computational hemodynamics: a black box approach”, in Int. J. High Performance Computing Appliations, DOI 10.1177/1094342016649245, pp 1-12, Vol 32(3), 2018.

F. Auricchio, M. Fedele, M. Ferretti, A. Lefieux, R. Romarowski, L. Santangelo, A. Veneziani, “Benchmarking a hemodynamics application on Intel based HPC systems, in “Parallel Computing is Everywhere”, Advances in Parallel Computing, Vol 32, pag. 57-66, Proc. PARCO 2017, IOS Press, ISBN 9781614998426, 2018.

M. Ferretti, L. Santangelo, “Hybrid OpenMP-MPI parallelism: porting experiments from small to large clusters”, in Proc. PDP 2018, 21-23 March 2018, Cambridge (UK), pp. 297-301, IEEE CPS, ISBN 978-1-5386-4975-6, 2018.

M. Ferretti, L. Santangelo, “Protein Secondary Structure Analysis in the Cloud”, in Proc. PBIO2018, Proceedings of the 6th International Workshop on Parallelism in Bioinformatics, pp. 63-70, Barcelona, Spain, September 23 - 23, ACM, ISBN: 978-1-4503-6531-4, doi 10.1145/3235830.3235837, 2018.