CURRICULUM VITAE ET STUDIORUM

Manuel Roveri

PERSONAL DATA

Name: Manuel
Surname: Roveri
Birth date: September 26, 1976
Birth Place: Milano, Italy
Citizenship: Italian

Office Address
Dipartimento di Elettronica, Informazione e Bioingegneria
Politecnico di Milano
Via Ponzio 34/5
I-20133, Milano (MI), Italy
Telefono: +39 02 2399 3590
Fax: +39 02 2399 3411
Email: manuel.roveri@polimi.it
Home page: http://roveri.faculty.polimi.it

EDUCATION

05/2007	Ph.D. degree in Computer Engineering, Dipartimento di Elettronica e Informazione, Politecnico di Milano, Milano, Italy.
	Thesis title: Just-in-Time Adaptive Classifiers.
	Advisor: Prof. C. Alippi, Politecnico di Milano, Milano, Italy.
06/2003	Laurea in Computer Engineering, Politecnico di Milano, Milano, Italy; final grade 95/100.
	Thesis title: A simulation environment for the concatenated and turbo codes analysis and optimization.
	Advisor: Prof. V. Piuri, Politecnico di Milano, Politecnico di Milano, Milano, Italy.
05/2003	Master of Science in Computer Science at the University of Illinois at Chicago (UIC), Chicago, Illinois, USA.
	Thesis title: A simulation environment for the concatenated and turbo codes analysis and optimization.
	Advisor: Prof. V. Kenyon, University of Illinois at Chicago, Chicago, USA.

7/2022-9/2022	Visiting Researcher, Department of Computing, Faculty of Engineering, Imperial College London, London (UK).
07/2015-	Professore Associato (equivalent to Associate Professor), Dipartimento di Elettronica, Informazione e Bioingegneria, Politecnico di Milano, Milano, Italy.
4/2011-5/2011	Visiting Researcher, Department of Electrical and Electronic Engineering, Faculty of Engineering, Imperial College London, London (UK).
12/2008–07/2015	Ricercatore di ruolo MIUR (equivalent to Assistant Professor), Dipartimento di Elettronica, Informazione e Bioingegneria, Politecnico di Milano, Milano, Italy.
03/2007–12/2008	Post-doc researcher, Dipartimento di Elettronica e Informazione, Politecnico di Milano, Milano, Italy. Project: "Computational intelligence techniques in adaptive wireless sensor networks and intelligent information processing systems".
10/2003–02/2005	Research Assistant, Dipartimento di Tecnologia dell'Informazione, Università degli Studi di Milano, Milano, Italy. Project: "Analysis and development of optimal allocation algorithms for distributed environmental monitoring agencies".

NATIONAL HABILITATION

11/2020	Abilitazione Scientifica Nazionale, Sett. 09/H1 – Sistemi di elaborazione delle Informazioni, Full Professor (Prima Fascia)
12/2013	Abilitazione Scientifica Nazionale, Sett. 09/H1 – Sistemi di elaborazione delle Informazioni, Associate Professor (Seconda Fascia).

SUMMARY OF THE SCIENTIFIC PRODUCTION

- **Scientific Productivity: 123 publications** (**118** entries on Scopus, **105** co-authors according to Scopus):

  - Author/Co-author of **21 top-ranked SCIMAGO Q1 - Computer Science** journal papers (including IEEE Transactions on Computers, IEEE Transactions on Neural Networks and Learning Systems, IEEE Transactions on Emerging Topics in Computational Intelligence, International Journal of Neural Systems, IEEE Transactions on Systems, Man, and Cybernetics, IEEE Transactions on Mobile Computing, IEEE Systems Journal, IEEE Computational Intelligence Magazine, IEEE Communication Magazine, Neural Networks, Neural Computing and Applications, Computer Communications) and

of **4 top-ranked SCIMAGO Q1 - Electrical and Electronic Engineering** journal papers (including IEEE Transactions on Instrumentation and Measurement, IEEE Sensors Journal).

- Author/Co-author of **74** scientific publications on peer-reviewed conferences including **4** top-level **A++/A+ Class 1** conferences (including Conference on Uncertainty in Artificial Intelligence, ACM/IEEE International Conference on Information Processing in Sensor Networks, IEEE International Conference on Pervasive Computing and Communications, International Joint Conference of Artificial Intelligence);

- Co-inventor of **4** patent **applications** with Politecnico di Milano (**1** out of **4** already **granted**).

- **Publication Impact (07/22):**   Based on Google Scholar: h-index **28**   citations **3713**

  Based on Scopus: h-index **23**   citations **2425**

RESEARCH ACTIVITY

The research activity addresses the design of methodologies, techniques and solutions for adaptive and intelligent information processing systems able to interact proactively with the environment and react and adapt to evolving time-variant situations, while guaranteeing energy-efficiency and privacy in the processing of acquired data. In detail, the research focuses on:

- the study and design of **embedded and edge AI** systems, i.e., embedded and edge computing systems inheriting intelligent mechanisms proper of human cognition;
- the investigation and design of **adaptive machine and deep learning techniques** able to deal with time-varying situations and guarantee the **privacy** during the entire data processing stage;
- the development of **intelligent pervasive embedded applications** able to operate in real-world (possibly harsh) environments.

These research activities are strictly related and integrated and can be intended within a research cycle. The research on adaptive machine and deep learning techniques provides novel intelligent mechanisms making embedded and edge computing systems adaptive and able to interact with the environment. The research on embedded and edge AI provides novel strategies and solutions to design pervasive intelligent embedded and edge computing systems able to interact with the environment and adapt to evolving time-varying scenarios. Finally, the "from the lab to the real world" research activity on the development of intelligent pervasive embedded applications meant to operate in harsh environmental conditions identifies novel research challenges to be addressed both at the theory and system level.

Embedded and Edge AI

"Artificial Intelligence at the Edge" (Edge-AI) is a novel, challenging, highly impacting research area whose aim is to provide distributed intelligent functionalities to Internet-of-Things (IoT) and Edge computing units composing an edge-network paradigm. As highlighted in the "Piano Nazionale della Ricerca 2021-2027" and in the EU "Horizon Europe" research strategic documents, Edge-AI is crucial to pave the way for a new generation of embedded AI-based systems able to guarantee real-time decision-making, privacy, and long-term energy sustainability. Moving AI to the edge is not a trivial task as it requires to revise the design of AI-based systems by integrating technological constraints on computation, memory and power consumption of IoT units as well as providing effective and efficient networking strategies among IoT and Edge computing units to support the requested AI processing.

In this path, the research aims at addressing methodological and algorithmic aspects of intelligent embedded and edge computing systems, i.e., embedded and edge computing systems endowed with computational intelligence and cognition abilities allowing them to deal with a pervasive uncertainty and learn from

acquired data during the operational life. IoT and Edge computing systems, cyber-physical systems, hybrid systems and wireless sensor networks are examples of the classes of pervasive systems considered in the research. More specifically, the research activity focuses on:

- the design of machine and deep learning methodologies and algorithms able to take into account the constraints on computation, memory and power consumption of pervasive embedded devices (this research area is also known as "Tiny Machine Learning"). To achieve this goal three different approaches have been considered. *First*, we re-designed the architectures of our machine and deep learning solutions and, in particular, of our neural networks. These new architectures are able to consider "by-design" the need to reduce the memory and the computational requirements by considering simplified and tiny models. In this research area, a new methodology has been proposed to guide the design of such tiny neural-network architectures under technological constraints on memory and computation. *Second*, approximate computing mechanisms have been designed and developed to further reduce memory occupation and computational demand of tiny models. Examples of such mechanisms are gate-classification, quantization and pruning. *Third*, the research is currently focusing on incremental on-device supervised learning in IoT units. This research line is crucial as current solutions perform inference only on IoT units, while the learning phase is typically carried either at the Edge or - mostly - the Cloud levels. In order to enable the learning at the IoT level, we introduced memory-efficient incremental learning mechanisms based on transfer learning and K-NN classifiers to support the learning of deep models directly on the IoT device. **The main results of this research activity can be found in A4, A9, A11, C4 and C13.**

- the study of distributed pervasive systems implementing adaptation, robustness and smart energy management mechanisms. Fault diagnosis is a relevant aspect of this research activity enabling mechanisms to face the insurgence of hardware and software faults. In particular, cognitive fault diagnosis systems have been designed to carry out the identification and isolation tasks by exploiting temporal and spatial dependencies in acquired datastreams. In addition, the research focused on the design of smart energy management mechanisms for intelligent embedded and cyber-physical systems. Designed solutions aimed at maintaining the Quality-of-Service and prolong the life-time of the systems by means of computation offloading in Fog Computing Networks, energy-aware local routing protocols, adaptive sensor sampling mechanisms as well as supporting a remote reconfiguration of the network units within a distributed framework. **The main results of this research activity can be found in A5, A10, A11, A12 and A28.**

- the design of Distributed and Federated Learning Mechanisms in IoT-Edge architectures, aiming at developing novel algorithms and solutions for the distributed inference and federated learning of machine and deep learning models where acquired data are distributed across multiple and heterogeneous networked IoT and Edge computing units. **The main results of this research activity can be found in A4 and C8.**

Particular attention has been also devoted to the design and the development of pervasive intelligent embedded systems with sensor capability by addressing application scenarios characterized by a large impact on the Society and able to operate in harsh environments. This "from the Lab to the Real world" research activity is described in the Section "Development of credible pervasive intelligent embedded and edge computing systems".

Adaptive and privacy-preserving machine and deep learning techniques

The research addresses theoretical, algorithmic and application-related aspects of machine/deep learning-based systems, with a specific focus on adaptation mechanisms allowing the system/application to track evolving environments. In order to achieve this goal we need to weaken the stationarity/time invariant assumption and develop adaptive management mechanisms based on the available knowledge to allow the intelligent systems to react and track changes in the data-generating process. These adaptive mechanisms have been also ported, in collaboration with the Reinforcement Learning (RL) Group at the DEIB, to the RL

scenario where changes in the environments or the reward function might occur. In addition, the research started focusing on privacy-preserving computation in machine and deep learning aiming at defining novel solutions for the design of privacy-based inference and learning of deep learning solutions operating in the Cloud or in Edge Computing systems.

In turn, this research has requested

- the definition of general-purpose adaptive solutions able to assess the stationary of a data-generating process and estimate the temporal instant the process generating the data deviates from its nominal state. **The main results of this research activity can be found in A15, A22, and A33**;

- the definition of the "Just-in-time" framework allowing the systems to reconfigure/update in a just-in-time manner, i.e., exactly when needed, their knowledge base. This approach represents a form of active learning where a triggering mechanism activates the response to changes in the process under monitoring (differently from other passive approaches present in the literature that force the continuous update of the application). Such a framework has been considered, for the first time in the literature, in the design of Deep Learning solutions (in our case Convolutional Neural Networks) able to react to changes in the data-generating process and adapt to new working conditions over time. **The main results of this research activity can be found in A6, A22, A25, A26, A33 and C16;**

- the study of RL algorithms able to detect changes in the environment or in the reward function and react to these changes by adapting the RL algorithm. To achieve this goal, specific change-detection and adaptation mechanisms on the optimizer have been considered, inspired by the just-in-time approach. **The main results of this research activity can be found in C7 and C13;**

- the definition of novel solutions and methodologies to allow the design of privacy-based learning and inference of machine and deep learning in heterogeneous hardware architectures. Such a privacy-preserving approach relies on Homomorphic Encryption (HE) that enables the processing directly on encrypted data. This ability, however, increases the computational load and the memory demand of HE-encoded operations (making their use very demanding in terms of computing infrastructures), while HE-encoded algorithms can only use a subset of operations (typically sums and multiplications). Both issues have been taken into consideration in the research activity, together with efficiency and effectiveness. **The main results of this research activity can be found in A1, C3, C10,** while PyCrCNN, the implementation of a privacy-preserving Machine-Learning-as-a-Service (MLaaS) based on Homomorphic Encryption (HE) for image classification, has been made available to the scientific community at the following GitHub repo: https://github.com/AlexMV12/PyCrCNN;

- the study and development of forecasting-as-a-service framework able to provide, in a "as-a-service" manner, a fully automatic end-to-end forecasting pipeline for multivariate and spatially distributed time-structured data comprising data ingestion, data preprocessing, data description, data prediction and service delivery. **The main results of this research activity can be found in C2 .** The framework has been released to the scientific community at the following GitHub repo: https://github.com/AlexMV12/TIMEX. A website implementing the framework to forecast the COVID-19 pandemic spread in Italy has been made available at the following url: https://covid-timex.it/

The research directions detailed above provide the theoretical foundation needed by intelligent embedded and edge computing systems described in the previous section.

In the field of adaptive and privacy-preserving machine and deep learning computation, the research collaboration with two Italian SMEs, i.e., SubCom s.r.l. and Catchy s.r.l., paved the way to the decision to found in October 2021 a start-up called DHIRIA (whose founders are Manuel Roveri, SubCom s.r.l. and Catchy s.r.l.). The goal of DHIRIA is the design and development of solutions and products to provide machine and

deep learning "as-a-service" able to process encrypted data by means of Homomorphic Encryption mechanisms. The ability to provide advanced machine /deep learning solutions in an "as-a-service" mode and the ability to process user data in an encrypted manner are the two distinctive and highly innovative features of DHIRIA. **DHIRIA has been officially accredited as Spin-Off of Politecnico di Milano in July 2021**. Further details can be found in the "Technology Transfer" Section of this CV.

Development of credible pervasive intelligent embedded and edge computing systems: "From the Lab to the Real world"

The outcomes of the theoretical research activities on embedded and edge AI and adaptive machine and deep learning techniques have been considered and ported to the "from the lab to the real world" applied research focusing on the development and deployment of credible intelligent pervasive embedded and edge computing systems. A credible deployment in a harsh environment sets the basics for identifying the real needs that an intelligent embedded/edge-computing system must expose. In this direction, we designed and deployed a set of systems where some basic intelligent mechanisms show to be fundamental to grant the Quality-of-Service in harsh environmental conditions. Remarkably, this "from the Lab to the Real world" activity is fundamental since it sets the challenges both at the technological and methodological level that need to be addressed by the research community at the basic research level.

For example, understanding the distribution of bird species and populations and learning how birds behave and communicate are of great importance in wildlife biology, animal ecology, conservation of ecosystems, and in assessing the effects of climate change and urbanization. To achieve this ambitious goal, within and international collaboration with the Northern Arizona University (US), we designed, developed and implemented a novel algorithmic and technological solution for birdsong detection based on deep learning. The proposed solution has been successfully deployed on an off-the-shelf IoT device (STM32H743ZINucleo) guaranteeing high detection accuracies, low power consumption and long operational lifetimes. **The main results of this research activity can be found in C6.**

A different application scenario refers to Space Weather (SW) forecasting. SW phenomena depend on the Sun's magnetic field and forecasting the solar magnetic field is an important research subject since the solar magnetic field can pose severe hazards to Earth technologies and systems. To achieve this goal, within an international collaboration with the National Research Council of Canada, we investigated the Global Oscillation Network Group (GONG) solar magnetograms 2006-2019 by means of techniques developed within the "Adaptive and privacy-preserving machine and deep learning techniques" research area. Such techniques were successful in providing insights about the behavior and evolution of the photospheric magnetic field, revealing patterns of activity and their relation with the different phases of the solar cycle. **The main results of this research activity can be found in C11.**

A novel GSM-based system for tracking bird's movement has been designed and developed within an Italian collaboration with Università di Milano Bicocca. Following the Internet-of-things vision, the proposed system comprises a set of lightweight and energy-efficient GSM-based tracking devices to be deployed on birds, one (or more) receiver(s) and a set of analysis/storage servers, hence supporting an Internet-of-Birds approach. The novel idea characterizing the proposed tracking system is the use of the GSM technology for both localization and transmission. The proposed GSM-based tracking system has been tested in a real deployment on four greater flamingos (*Phoenicopterus roseus*) for approximately 11 months in Northern Italy. **The main results of this research activity can be found in C22.**

A real-time monitoring system for rock collapse forecasting that exploits MEMS accelerometers and geophones (in addition to traditional sensors such as strain-gauges, tiltmeters, flowmeters) for non-invasive detection of micro-acoustic bursts associated with the formation and the evolution of cracks within the rocks has been designed and developed. This system has been deployed in 2010-2012 in several critical areas of the Italian-Swiss Alps: S. Martino Mountain; Torrioni di Rialba; Val Canaria, Ticino, Switzerland; Gallivaggio. The proposed monitoring system relies on a network of intelligent embedded systems characterized by high-

frequency sampling hybrid wireless-wired architectures tailored to detect and –hopefully- localize micro-acoustic emissions in the rock face, yet maintaining an high energy-efficiency by means of effective energy management policies and sophisticated adaptive energy harvesting mechanisms. **The main results of this research activity can be found in A24 and B6.**

An intelligent landslide monitoring system based on a wireless network of intelligent embedded systems has been designed and developed in 2011-2012. This system has been considered to investigate critical areas of Italian Alps: Torrioni di Rialba and Premana. Aspects related to intelligent power management, remote units reconfigurability, remote code upload and effective data storage, aggregation and visualization have been considered and addressed in this research. **The main results of this research activity can be found in A24 and B6.**

A robust, adaptive, solar powered framework based on a wireless sensor network for marine environment monitoring has been deployed in Queensland, AUS (Nov. 2007) for monitoring the underwater light and temperature. All aspects of the environmental monitoring system such as sensing activity, local transmission (from sensor nodes to gateways), remote transmission (from the gateways to the control center), data storage and visualization have been addressed to guarantee robustness and adaptability to network changes. **The main results of this research activity can be found in A27 and B4.**

The design, implementation and deployment of these pervasive networked intelligent embedded and edge computing systems required a high degree of cross-disciplinarity with continuous discussions with biologists, physicists, geologists and geophysicists. The interaction with phenomenon experts represented a challenging but fruitful activity that lead to the design and development of effective and efficient monitoring systems.

PUBLICATIONS

INTERNATIONAL JOURNALS

A1. A. Falcetta, M. Roveri, "Privacy-preserving machine learning with homomorphic encryption: an introduction", IEEE Computational Intelligence Magazine, August, 2022 **[Q1 SCIMAGO - Computer Science]**.

A2. G. Canonaco, M. Roveri, C. Alippi, F. Podenzani, A. Bennardo, M. Conti, N. Mancini, "A transfer-learning approach for corrosion prediction in pipeline infrastructures". Applied Intelligence, Vol. 52, N. 7, pp. 7622-7637, 2022. **[Q2 SCIMAGO – Computer Science]**

A3. A. Soldevila,G. Boracchi, M. Roveri, S. Tornil-Sin, V. Puig, "Leak detection and localization in water distribution networks by combining expert knowledge and data-driven models", Neural Computing and Applications, Vol. 34**,** pp. 4759–4779, 2022 **[Q1 SCIMAGO - Computer Science]**.

A4. S. Disabato, M. Roveri, C. Alippi. "Distributed deep convolutional neural networks for the internet-of-things." IEEE Transactions on Computers, vol. 70, no. 8, pp. 1239-1252, 1 Aug. 2021, doi: 10.1109/TC.2021.3062227 **[Q1 SCIMAGO - Computer Science]**.

A5. A. Bozorgchenani, S. Disabato, D. Tarchi, M. Roveri, "An Energy Harvesting Solution for Computation Offloading in Fog Computing Networks", in Computer Communications, Elsevier, 2020, 160, pp.577-587 **[Q1 SCIMAGO - Computer Science]**.

A6. M. Roveri, "Learning Discrete-Time Markov Chains Under Concept Drift," in IEEE Transactions on Neural Networks and Learning Systems, vol. 30, no. 9, pp. 2570-2582, Sept. 2019 **[Q1 SCIMAGO - Computer Science]**.

A7.   R. Fantacci, F. Nizzi, T. Pecorella, L. Pierucci, M. Roveri, "False Data Detection for Fog and Internet of Things Networks", Sensors 2019, 19, 4235. **[Q2 SCIMAGO - Computer Science]**.

A8.   Giuzio, Antonio, Giansalvatore Mecca, Elisa Quintarelli, Manuel Roveri, Donatello Santoro, and Letizia Tanca. "INDIANA: An interactive system for assisting database exploration." Information Systems, Vol. 83, Pages 40-56, 2019. **[Q2 SCIMAGO - Computer Science]**.

A9.   C. Alippi and M. Roveri, "The (Not) Far-Away Path to Smart Cyber-Physical Systems: An Information-Centric Framework," in *IEEE Computer*, vol. 50, no. 4, pp. 38-47, April 2017. **[Q1 SCIMAGO - Computer Science]**.

A10.   C. Alippi, S. Ntalampiras and M. Roveri, "Model-Free Fault Detection and Isolation in Large-Scale Cyber-Physical Systems," in *IEEE Transactions on Emerging Topics in Computational Intelligence*, vol. 1, no. 1, pp. 61-71, Feb. 2017. **[Q1 SCIMAGO - Computer Science]**

A11.   M. Roveri, F. Trovò, "An Ensemble Approach for Cognitive Fault Detection and Isolation in Sensor Networks", International Journal of Neural Systems, vol. 27, no. 3, pp. 16, 2017. **[Q1 SCIMAGO - Computer Science]**

A12.   C. Alippi, R. Fantacci, D. Marabissi, M. Roveri, "A Cloud to the Ground: The New Frontier of Intelligent and Autonomous Networks of Things", IEEE Communication Magazine, Vol.54, No 12, pp. 14-20, December 2016. **[Q1 SCIMAGO - Computer Science]**

A13.   G. Boracchi, M. Michaelides, M. Roveri, "A cognitive monitoring system for detecting and isolating contaminants and faults in intelligent buildings." IEEE Transactions on Systems, Man, and Cybernetics: Systems, Vol. 48, No.3, pp. 433-447, 2016. **[Q1 SCIMAGO - Computer Science]**.

A14.   S. Brienza, M. Roveri, D. De Guglielmo, G. Anastasi, "Just-in-Time Adaptive Algorithm for Optimal Parameter Setting in 802.15.4 WSNs", ACM Transactions on Autonomous and Adaptive Systems (TAAS), vol. 10, no. 4, 2016. **[Q2 SCIMAGO - Computer Science]**

A15.   C. Alippi; G. Boracchi; M. Roveri, "Hierarchical Change-Detection Tests", IEEE Transactions on Neural Networks and Learning Systems, Vol. 28, No. 2, pp.246-258, 2016. **[Q1 SCIMAGO - Computer Science]**.

A16.   C. Alippi, M. Bocca, G. Boracchi, N. Patwari, M. Roveri, RTI Goes Wild: Radio Tomographic Imaging for Outdoor People Detection and Localization, IEEE Transactions on Mobile Computing, vol. 15, no. 10, pp. 2585-2598, 2016. **[Q1 SCIMAGO - Computer Science]**

A17.   Alippi, G. Boracchi and M. Roveri, "A Reprogrammable and Intelligent Monitoring System for Rock-Collapse Forecasting," in IEEE Systems Journal, vol. 10, no. 2, pp. 733-744, June 2016. **[Q1 SCIMAGO - Computer Science]**

A18.   M. À. Cugueró-Escofet, J. Quevedo, C. Alippi, M. Roveri, V. Puig, D. García and F. Trovò, "Model- vs. data-based approaches applied to fault diagnosis in potable water supply networks", Journal of Hydroinformatics, vol. 18, no. 6, 2016

A19.   Buoncristiano, G. Mecca, E. Quintarelli, M. Roveri, D. Santoro, and L. Tanca, "Database Challenges for Exploratory Computing", SIGMOD Rec. Vol. 44, No. 2, pp. 17-22, August 2015 **[Q2 SCIMAGO - Computer Science]**

A20.   G. Ditzler, M. Roveri, C. Alippi and R. Polikar, "Learning in Nonstationary Environments: A Survey," in *IEEE Computational Intelligence Magazine*, vol. 10, no. 4, pp. 12-25, Nov. 2015. **[Q1 SCIMAGO - Computer Science]**. ***This paper received the Outstanding Computational Intelligence Magazine Paper Award from the IEEE Computational Intelligence Society in 2018.***

A21. C. Alippi, M. Roveri, F. Trovò, "A Self-building and Cluster-based Cognitive Fault Diagnosis System for Sensor Networks", IEEE Transactions on Neural Networks and Learning Systems, Vol. 25, No. 6, pp. 1021-1032, June 2014. **[Q1 SCIMAGO - Computer Science]**.

A22. C. Alippi, G. Boracchi, M. Roveri, "Ensembles of Change-Point Methods to Estimate the Change Point in Residual Sequences", Soft Computing, Springer, Vol. 17, No. 11, pp. 1971-1981, Nov. 2013. **[Q2 SCIMAGO - Computer Science]**

A23. C. Alippi, S. Ntalampiras, M. Roveri, "A Cognitive Fault Diagnosis System for Distributed Sensor Networks", IEEE Transactions on Neural Networks and Learning Systems, Vol. 24, No. 8, pp. 1213-1226, Aug. 2013. **[Q1 SCIMAGO - Computer Science]**.

A24. C. Alippi, R. Camplani, C. Galperti, A. Marullo, M. Roveri, "A high frequency sampling monitoring system for environmental and structural applications", ACM Transactions on Sensor Networks, Vol. 9, No. 4, Art. 41, 32 pages, July 2013. **[Q2 SCIMAGO - Computer Science]**

A25. C. Alippi, G. Boracchi, M. Roveri, "Just In Time Classifiers for Recurrent Concepts", IEEE Transactions on Neural Networks and Learning Systems, Vol. 24, No. 4, pp. 620 – 634, April 2013. **[Q1 SCIMAGO - Computer Science]**. *__This paper received the IEEE CIS Outstanding TNNLS Paper Award from the IEEE Computational Intelligence Society in 2016.__*

A26. C. Alippi, G. Boracchi, M. Roveri, "A just-in-time adaptive classification system based on the intersection of confidence intervals rule", Neural Networks, Elsevier, Vol. 24, No. 8, pp. 791-800, Oct. 2011. **[Q1 SCIMAGO - Computer Science]**.

A27. C. Alippi, R. Camplani, C. Galperti, M. Roveri, "A robust, adaptive, solar powered WSN framework for aquatic environmental monitoring", IEEE Sensors Journal, Vol. 11, No. 1, pp. 45-55, Jan. 2011. **[Q1 SCIMAGO - Electrical and Electronic Engineering]**.

A28. C. Alippi, G. Boracchi, R. Camplani, M. Roveri, "Detecting External Disturbances on Camera Lens in Wireless Multimedia Sensor Networks", IEEE Transactions on Instrumentation and Measurement, Vol. 59, No. 11, pp. 2982-2990, Nov. 2010. **[Q1 SCIMAGO - Electrical and Electronic Engineering]**.

A29. C. Alippi, G. Anastasi, M. Di Francesco, M. Roveri, "An Adaptive Sampling Algorithm for Effective Energy Management in Wireless Sensor Networks with Energy-hungry Sensors", IEEE Transactions on Instrumentation and Measurement, Vol. 58, No. 11, pp. 335 – 344, Nov. 2009. **[Q1 SCIMAGO - Electrical and Electronic Engineering]**.

A30. C. Alippi, R. Camplani, M. Roveri, "An Adaptive, LLC-based and Hierarchical Power-aware Routing Algorithm", IEEE Transactions on Instrumentation and Measurement, Vol. 58, No. 9, pp. 3347-3357, Sept. 2009. **[Q1 SCIMAGO - Electrical and Electronic Engineering]**.

A31. C. Alippi, G. Anastasi, M. Di Francesco, M. Roveri, "Energy Management in Wireless Sensor Networks with Energy-Hungry Sensors", IEEE Instrumentation and Measurement Magazine, Vol. 12, No. 2, pp. 16-23, April 2009. **[Q2 SCIMAGO - Electrical and Electronic Engineering]**.

A32. C. Alippi, M. Roveri, "Just-in-time Adaptive Classifiers. Part II. Designing the classifier", IEEE Transactions on Neural Networks, Vol. 19, No. 12, pp. 2053 – 2064, Dec. 2008. **[Q1 SCIMAGO - Computer Science]**.

A33. C. Alippi, M. Roveri, "Just-in-time Adaptive Classifiers. Part I. Detecting non-stationary Changes", IEEE Transactions on Neural Networks, Vol. 19, No. 7, pp. 1145 – 1153, July 2008. **[Q1 SCIMAGO - Computer Science]**.

A34. F. Amigoni, N. Gatti, C. Pinciroli, M. Roveri, "What Planner for Ambient Intelligence Applications?", IEEE Transactions on Systems, Man, and Cybernetics, Part A: Systems and Humans, Vol. 35, No. 1, pp. 7–21, Jan. 2005. **[Q1 SCIMAGO - Computer Science]**.

ITALIAN JOURNALS

I1. A. Capone, M. Cesana, M. Roveri, "Gli oggetti nel futuro di Internet", Rivista AEIT, n. 11/12, Nov./Dec. 2012.

BOOK CHAPTERS

B1. F. A. Schreiber and M. Roveri, "Sensors and Wireless Sensor Networks as data sources: models and languages", Data Management in Pervasive Systems - Springer Cham, Heidelberg, pp.69-92, 2015.

B2. C. Alippi, R. Camplani, A. Marullo, M. Roveri, "Algorithms and Tools for Intelligent Monitoring of Critical Infrastructure Systems", Intelligent Monitoring, Control, and Security of Critical Infrastructure Systems, Studies in Computational Intelligence, Springer Berlin Heidelberg, Vol. 565, pp. 167-184, 2015.

B3. C. Alippi, G. Boracchi, G. Ditzler, R. Polikar, M. Roveri, "Adaptive Classifiers for Nonstationary Environments", Contemporary Issues in Systems Science and Engineering, IEEE/Wiley Press Book Series, 2015.

B4. C. Alippi, G. Boracchi, M. Roveri, "Above and below the ocean surface: a WSN framework for monitoring the Great Barrier Reef", Building Sensor Networks: From Design to Applications, CRC Press, pp. 271- 290, Sept. 2013.

B5. C. Alippi, G. Boracchi, R. Camplani, M. Roveri, "Wireless Sensor Networks for Monitoring Vineyards", Methodologies and Technologies for Networked Enterprises, Lecture Notes in Computer Science, LNCS 7200, pp. 295-310, July 2012.

B6. C. Alippi, R. Camplani, A. Marullo, M. Roveri, "A Real-Time Monitoring Framework for Landslide and Rock-Collapse Forecasting", Smart Sensing Technology for Agriculture and Environmental Monitoring, Lecture Notes in Electrical Engineering, Springer, Vol. 146, pp. 285-302, 2012.

B7. C. Alippi, A. Marullo, M. Roveri, "Nuovi Sistemi di Monitoraggio: Infrastrutture di Acquisizione e di Trasmissione Dati", MIARIA Tecnologia e Conoscenza al Servizio della Sicurezza, Bellavite Ed., Vol. 1, 2011.

B8. C. Alippi, R. Camplani, C. Galperti, M. Roveri, "From labs to real environments: the dark side of WSNs", Recent Advances in Sensing Technology Series: Lecture Notes in Electrical Engineering, Springer Verlag, Vol. 49, pp. 143-168, 2009.

B9. C. Alippi, M. Roveri, G. Vanini, "Robustness in Neural Networks", Encyclopedia of Information Science and Technology, 2nd ed., Ed. Information Science Reference, Hershey - New York, Vol. 7, pp. 3314-3321, 2008.

PUBLICATIONS AT INTERNATIONAL CONFERENCES AND WORKSHOPS

C1. M. Gambella, A. Falcetta, M. Roveri, "CNAS: Constrained Neural Architecture Search", Accepted at the 2022 IEEE International Conference on Systems, Man, and Cybernetics (IEEE SMC 2022), Prague, 2022.

C2.   A. Falcetta, M. Roveri, "TIMEX: an Automatic Framework for Time-Series Forecasting-as-a-Service", Accepted at the 6th International Workshop on Automation in Machine Learning, held in conjunction with the SIGKDD Conference on Knowledge Discovery and Data Mining conference (KDD2022), Washington DC, 2022.

C3.   A. Falcetta, M. Roveri, "Privacy-preserving time series prediction with temporal convolutional neural networks", in Proc. 2022 International Joint Conference on Neural Network (IJCNN2022), Padova, Italy, 2022.

C4.   M. Pavan, A. Caltabiano, M. Roveri, "TinyML for UWB-radar based presence detection", in Proc. 2022 International Joint Conference on Neural Network (IJCNN2022), Padova, Italy, 2022.

C5.   D. Christofidellis, A. Berrios Torres, A. Dave, M. Roveri, K. Schmidt, S. Swaminathan, H. Vandierendonck, D. Zubarev, M. Manica, "PGT: a prompt based generative transformer for the patent domain", In Proc. Workshop on Knowledge Retrieval and Language Models, held in conjunction with the 39th International Conference on Machine Learning (ICML 2022), Baltimore, 2022.

C6.   S. Disabato, G. Canonaco, P. Flikkema, M. Roveri, C. Alippi, "Birdsong Detection at the Edge with Deep Learning", in Proc. 7th IEEE International Conference on Smart Computing (SMARTCOMP 2021), pp. 9-16, 2021.

C7.   G. Canonaco, A. Soprani, M. Roveri, M. Restelli, "Time-Variant Variational Transfer for Value Functions", in Proc. 37th Conference on Uncertainty in Artificial Intelligence (UAI2021), Online, July 27-30, 2021. **[A++/A+ Class 1 conference]**

C8.   G. Canonaco, A. Bergamasco, A. Mongelluzzo, M. Roveri, "Adaptive Federated Learning in Presence of Concept Drift", in Proc. 2021 International Joint Conference on Neural Network (IJCNN2021), 2021.

C9.   S. Disabato, M. Roveri. "Incremental On-Device Tiny Machine Learning." in Proc. 2nd International Workshop on Challenges in Artificial Intelligence and Machine Learning for Internet of Things. 2020.

C10. S. Disabato, A. Falcetta, A. Mongelluzzo, M. Roveri, "A privacy-preserving distributed architecture for deep-learning-as-a-service", in Proc. 2020 International Joint Conference on Neural Networks (IJCNN), Glasgow, 2020.

C11. J. Valdes, L. Nikolic, S. Disabato and M. Roveri, "A Computational Intelligence Characterization of Solar Magnetograms", in Proc. 2020 International Joint Conference on Neural Networks (IJCNN), Glasgow, 2020.

C12. G. Canonaco, M. Roveri, C. Alippi, F. Podenzani, A. Bennardo, M. Conti, N. Mancini, "Corrosion Prediction in Oil and Gas Pipelines: a Machine Learning Approach", in Proc. IEEE International Instrumentation and Measurement technology Conference (I^2MTC), 2020.

C13. G. Canonaco, M. Restelli, M. Roveri, "Model-Free Non-Stationarity Detection and Adaptation in Reinforcement Learning", in Proc. 24th European Conference on Artificial Intelligence (ECAI 2020), 2020.

C14. F. Conti, G. Lorenzini, G. Parenti, D. Scaccabarozzi, M. Roveri, M. Tarabini, "Prototyping and Metrological Characterization of a Data Acquisition and Processing System Based on Edge Computing", in Proc. 2020 IEEE International Workshop on Metrology for Industry 4.0 & IoT (MetroInd4.0&IoT), 2020.

C15. S. Disabato, M. Roveri, "Learning Convolutional Neural Networks in presence of Concept Drift", in Proc. 2019 International Joint Conference on Neural Networks (IJCNN), Budapest, Hungary, 2019, pp. 1-8.

C16. S. Disabato and M. Roveri, "Reducing the Computation Load of Convolutional Neural Networks through Gate Classification," in Proc. 2018 International Joint Conference on Neural Networks (IJCNN), Rio de Janeiro, 2018, pp. 1-8.

C17. D. Cogliati, M. Falchetto, D. Pau, M. Roveri and G. Viscardi, "Intelligent Cyber-Physical Systems for Industry 4.0," in Proc. 2018 International Conference on Artificial Intelligence for Industries (AI4I), Laguna Hills, CA, USA, 2018, pp. 19-22.

C18. C. Alippi, S. Disabato, M. Roveri, "Moving Convolutional Neural Networks to Embedded Systems: the AlexNet and VGG-16 case", in Proc. 2018 ACM/IEEE International Conference on Information Processing in Sensor Networks Porto (IPSN 2018), Portugal, April 11-13, 2018. **[A++/A+ Class 1 conference]**

C19. C. Alippi, M. Roveri, I. Scarabottolo, "A spectrum-based adaptive sampling algorithm for smart sensing", in Proc. IEEE 3rd International Conference on Smart World Congress (SmartWorld 2017), San Francisco, USA, 4-8 August 2017.

C20. C. Alippi, V. D'Alto, M. Falchetto, D. Pau and M. Roveri, "Detecting changes at the sensor level in cyber-physical systems: Methodology and technological implementation," in Proc. 2017 International Joint Conference on Neural Networks (IJCNN), Anchorage, AK, 2017, pp. 1780-1786.

C21. C. Alippi, W. Qi, M. Roveri, "Learning in Nonstationary Environments: A Hybrid Approach", in Proc. International Conference on Artificial Intelligence and Soft Computing (ICAISC), 2017, pp. 703-714.

C22. C. Alippi, R. Ambrosini, D. Cogliati, V. Longoni, M. Roveri, "A lightweight and energy-efficient Internet-of-Birds Tracking System", in Proc. IEEE International Conference on Pervasive Computing and Communications (PerCom 2017), Hawaii, USA, 13-17 March 2017. **[A++/A+ Class 1 conference]**

C23. Pinciroli R., Gribaudo M., Roveri M., Serazzi G., "Capacity Planning of Fog Computing Infrastructures for Smart Monitoring". In: Balsamo S., Marin A., Vicario E. (eds) New Frontiers in Quantitative Methods in Informatics. InfQ 2017. Communications in Computer and Information Science, vol 825. Springer, 2017.

C24. C. Alippi, S. Ntalampiras and M. Roveri, "Designing HMM Models in the Age of Big Data", in Proc. INNS Conference on Big Data, October 23-25, 2016, Thessaloniki, Greece, 2016. *__This paper won the Best Regular Paper Award.__*

C25. G. Tacconelli, M. Roveri, "A CPM-based Change Detection Test for Big Data", in Proc. INNS Conference on Big Data, October 23-25, 2016, Thessaloniki, Greece, 2016.

C26. C. Alippi, G. Boracchi, D. Carrera, M. Roveri, "Change Detection in Multivariate Datastreams: Likelihood and Detectability Loss", in Proc. International Joint Conference of Artificial Intelligence (IJCAI), New York, USA, July 9 – 13, 2016 **[A++/A+ Class 1 conference]**

C27. C. Alippi, S. Ntalampiras and M. Roveri, "Online Model-free Sensor Fault Identification and Dictionary Learning in Cyber-Physical Systems", in Proc. IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2016), July 24 – 29, 2016, Vancouver, Canada.

C28. M. Roveri, C. Alippi and W. Qi, "An improved Hilbert-Huang Transform for non-linear and time-variant signals", in Proc. 26th Italian Workshop on Neural Networks (WIRN 2016), May 18-20, 2016, Vietri Sul Mare, Italy

C29. M. Roveri, G. Boracchi, M. P Michaelides, "Detecting Contaminants in Smart Buildings by Exploiting Temporal and Spatial Correlation" in Proc. 2015 IEEE Symposium Series on Computational Intelligence (IEEE SSCI 2015), Dec. 7-10, 2015, Cape Town, South Africa.

C30. M. Roveri and F. Trovò, "Making Intelligent the Embedded Systems through Cognitive Outlier and Fault Detection", in Proc. 25th Italian Workshop on Neural Networks (WIRN 2015), May 20-22, 2015, Vietri Sul Mare, Italy

C31. M. Buoncristiano, G. Mecca, E. Quintarelli, M. Roveri, D. Santoro and L. Tanca, "Exploratory Computing: What is there for the Database Researcher?" in Proc. 23rd Italian Symposium on Advanced Database Systems (SEBD 2015), June 14-17, Gaeta, Italy.

C32. C. Alippi, M. Roveri, F. Trovò, "Learning Causal Dependencies to Detect and Diagnose Faults in Sensor Networks", in Proc. 2014 IEEE Symposium Series on Computational Intelligence (IEEE SSCI 2014), Dec. 9-12, 2014, Orlando, Florida.

C33. A. Antola, L. Mezzalira, M. Roveri, "GINGER: a minimizing-effects reprogramming paradigm for distributed sensor networks", in Proc. 2014 IEEE International Symposium on Robotic and Sensors Environments (IEEE ROSE 2014), Oct. 16-18, Timisoara, Romania, 2014.

C34. M. Roveri, F. Trovò, "An Ensemble of HMMs for Cognitive Fault Detection in Distributed Sensor Networks", in Proc. 10th International Conference on Artificial Intelligence Applications and Innovations (AIAI 2014), Sep. 19-21, Rhodes, Greece, 2014.

C35. G. Boracchi, M. Michaelides, M. Roveri, "A Cognitive Monitoring System for Contaminant Detection in Intelligent Buildings", in Proc. IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2014), July 6 – 11, 2014, Beijing, China.

C36. G. Boracchi, M. Roveri, "Exploiting Self-Similarity for Change Detection", in Proc. IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2014), July 6 – 11, 2014, Beijing, China.

C37. G. Boracchi, M. Roveri, "A Reconfigurable and Element-wise ICI-based Change-Detection Test for Streaming Data", in Proc. IEEE International Conference on Computational Intelligence and Virtual Environments for Measurement Systems and Applications (IEEE CIVEMSA 2014), May 5-7 2014, Ottawa, Ontario, Canada

C38. S. Ntalampiras, M. Roveri, "Rock Collapse Forecasting: a Novel Approach Based on the Classification of Micro-Acoustic Signals in the Wavelet Domain", in Proc. IEEE SENSORS Conference (IEEE SENSORS 2013), Baltimore, USA, Nov. 3-6, 2013.

C39. S. Brienza, D. De Guglielmo, C. Alippi, G. Anastasi, M. Roveri, "A Learning-based Algorithm for Optimal MAC Parameters Setting in IEEE 802.15.4 Wireless Sensor Networks", in Proc. ACM International Symposium on Performance Evaluation of Wireless Ad Hoc, Sensor, and Ubiquitous Networks (ACM PE-WASUN 2013), Barcelona, Spain, Nov. 3-7, 2013.

C40. G. Boracchi, V. Puig, M. Roveri, "A Hierarchy of Change-Point Methods for Estimating the Time Instant of Leakages in Water Distribution Networks", in Proc. Workshop on Learning strategies and data processing in nonstationary environments (LEAPS 2013), Paphos, Cyprus, Sept. 30 - Oct. 2, 2013.

C41. C. Alippi, S. Ntalampiras, M. Roveri, "Model ensemble for an effective on-line reconstruction of missing data in sensor networks", in Proc. IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2013), Dallas, USA, Aug. 4-9, 2013.

C42. J. Quevedo, C. Alippi, M.A. Cuguero, S. Ntalampiras, V. Puig, M. Roveri, D. Garcıa, "Temporal/Spatial Model-Based Fault Diagnosis vs. Hidden Markov Models Change Detection Method: Application to the Barcelona Water Network", in Proc. Mediterranean Conference on Control and Automation (MED'13), Crete, Greece, June 25-28, 2013.

C43. C. Alippi, G. Boracchi, V. Puig, M. Roveri, "An Ensemble Approach to Estimate the Fault-Time Instant", in Proc. IEEE International Conference on Intelligent Control and Information Processing (IEEE ICICIP 2013), Beijing, China, June 9 - 11, 2013.

C44. C. Alippi, R. Camplani, M. Roveri, G. Viscardi, "NetBrick: a high-performance, low-power hardware platform for wireless and hybrid sensor network", in Proc. IEEE International Conference on Mobile Ad hoc and Sensor Systems (IEEE MASS 2012), Las Vegas, USA, Oct. 8-11, 2012

C45. C. Alippi, M. Roveri, F. Trovò, "A ''learning from models'' cognitive fault diagnosis system", in Proc. ENNS International Conference on Artificial Neural Networks (ICANN 2012), Lausanne, Swizerland, Sept. 11-14, 2013.

C46. C. Alippi, G. Boracchi, M. Roveri, "On-line reconstruction of missing data in sensor/actuator networks by exploiting temporal and spatial redundancy", in Proc. IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2012), Brisbane, Australia, June 10-15, 2012.

C47. C. Alippi, S. Ntalampiras, M. Roveri, "An HMM-based change detection method for intelligent embedded sensors", in Proc. IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2012), Brisbane, Australia, June 10-15, 2012.

C48. C. Alippi, G. Boracchi, M. Roveri, "Just-In-Time Ensemble of Classifiers", in Proc. IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2012), Brisbane, Australia, June 10-15, 2012.

C49. T. Mahmoodi, M. Roveri, "Identifying network failure via detecting changes in power profile", in Proc. IEEE Pervasive Computing and Communications Workshops (IEEE PERCOM Workshops), pp. 758-763, Lugano, Switzerland, March 23, 2012.

C50. C. Alippi, R. Camplani, M. Roveri, L. Vaccaro, "REEL: a real-time, computationally-efficient, reprogrammable framework for Wireless Sensor Networks", in Proc. IEEE Sensors Conference (IEEE SENSORS 2011), Limerik, Ireland, Oct. 28-31, 2011.

C51. C. Alippi, G. Boracchi, A. Marullo, M. Roveri, "A Step Towards the Prediction of a Rock Collapse: Analysis of Micro-Acoustic Bursts", in Proc. IEEE Sensors Conference (IEEE SENSORS 2011), Limerik, Ireland, Oct. 28-31, 2011.

C52. C. Alippi, G. Boracchi, M. Roveri, "An Effective Just-in-Time Adaptive Classifier for Gradual Concept Drifts", in Proc. IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2011), San Jose, USA, July 31 – Aug. 5, 2011.

C53. C. Alippi, G. Boracchi, M. Roveri, "A Hierarchical, Nonparametric Sequential Change-Detection Test", in Proc. IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2011), San Jose, USA, July 31 – Aug. 5, 2011.

C54. C. Alippi, G. Boracchi, M. Roveri, "A distributed Self-adaptive Nonparametric Change-Detection Test for Sensor/Actuator Networks", in Proc. ENNS International Conference on Artificial Neural Networks (ICANN 2011), Espoo, Finland, June 14-17, 2011. Lecture Notes in Computer Science, Vol. 6792/2011, pp. 173-180, 2011.

C55. C. Alippi, R. Camplani, C. Galperti, A. Marullo, M. Roveri, "An hybrid wireless-wired monitoring system for real-time rock collapse forecasting", in Proc. IEEE International Conference on Mobile Ad-hoc and Sensor Systems (IEEE MASS 2010), San Francisco, USA, Nov. 8-12, 2010.

C56. C. Alippi, G. Boracchi, M. Roveri, "Adaptive Classifiers with ICI-based Adaptive Knowledge Base Management", in Proc. ENNS International Conference on Artificial Neural Networks (ICANN 2010), Thessaloniki, Greece, Sept. 15-18, 2010.

C57. C. Alippi, G. Boracchi, M. Roveri, "Change Detection Tests Using the ICI rule", in Proc. IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2010), Barcelona, Spain, July 18-23, 2010.

C58. C. Alippi, M. Roveri, "Virtual k-fold cross validation: an effective method for accuracy assessment", in Proc. IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2010), Barcelona, Spain, July 18-23, 2010.

C59. C. Alippi, G. Boracchi, M. Roveri, "Detecting Drops on Lens in Wireless Multimedia Sensor Network Nodes", in Proc. IEEE International Workshop on RObotic and Sensors Environments (IEEE ROSE 2009), pp. 128-133, Lecco, Italy, Nov. 6-7, 2009.

C60. C. Alippi, R. Camplani, M. Roveri, "A Virtual Machine for energy management in WSNs", in Proc. IEEE International Workshop on RObotic and Sensors Environments (IEEE ROSE 2009), pp. 173-177, Lecco, Italy, Nov. 6-7, 2009.

C61. C. Alippi, G. Boracchi, M. Roveri, "Just in time classifiers: managing the slow drift case", in Proc. IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2009), Atlanta, USA, June 14-16, 2009.

C62. C. Alippi, G. Baroni, A. Bersani, M. Roveri, "Unsupervised feature selection algorithms for Wireless Sensor Network", in Proc. IEEE International Conference on Computational Intelligence for Measurement Systems and Applications (IEEE CIMSA 2009), Hong Kong, China, May 11-13, 2009.

C63. C. Alippi, R. Camplani, C. Galperti, M. Roveri, "Effective design of WSNs: from the lab to the real world", in Proc. IEEE International Conference on Sensing Technology (IEEE ICST 2008), Tainan, Taiwan, Nov 30 - Dec 3, 2008.

C64. C. Alippi, M. Fuhrman, M. Roveri, "k-NN classifiers: investigating the k = k(n) relationship", in Proc. IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2008), Hong Kong, June 1-6, 2008.

C65. C. Alippi, R. Camplani, C. Galperti, M. Roveri, L. Sportiello, "Towards a credible WSNs deployment: a monitoring framework based on an adaptive communication protocol and energy-harvesting availability", in Proc. IEEE International Instrumentation and Measurement Technology Conference (IEEE I2MTC 2008), pp. 66-71, Victoria, Canada, May 12-15, 2008.

C66. C. Alippi, R. Camplani, M. Roveri, "A Hierarchical LLC Routing Algorithm for WSNs", in Proc. IEEE International Workshop on RObotic and Sensors Environments (IEEE ROSE 2007), pp. 1-6, Ontario, Canada, Oct. 12-13, 2007.

C67. C. Alippi, G. Anastasi, C. Galperti, F. Mancini, M. Roveri, "Adaptive Sampling for Energy Conservation in Wireless Sensor Networks for Snow Monitoring Applications", in Proc. IEEE International Conference on Mobile Ad-hoc and Sensor Systems (IEEE MASS 2007), pp. 1 – 6, Pisa, Italy, Oct. 8-11, 2007.

C68. C. Alippi, M. Roveri, "Adaptive Classifiers in Stationary Conditions", in Proc. IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2007), pp. 1008 – 1013, Orlando, USA, Aug. 12-17, 2007.

C69. C. Alippi, M. Roveri, "Just-in-Time Adaptive Classifiers in Non-Stationary Conditions", in Proc. IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2007), pp. 1014 - 1019, Orlando, USA, Aug. 12-17, 2007.

C70. C. Alippi, M. Roveri, "Reducing Computational Complexity in k-NN based Adaptive Classifiers", in Proc. International Conference on Computational Intelligence for Measurement Systems and Applications (IEEE CIMSA 2007), pp. 68 – 71, Ostuni, Italia, June 27-29, 2007.

C71. C. Alippi, G. Pelosi, M. Roveri, "Computational intelligence techniques to detect toxic gas presence", in Proc. International Conference on Computational Intelligence for Measurement Systems and Applications (IEEE CIMSA 2006), pp. 40 – 44, La Coruna, Spain, July 12-14, 2006.

C72. M. Gamassi, M. Roveri, F. Scotti, V. Piuri, "Genetic Techniques for Pattern Extraction in Particle Boards Images", in Proc. International Conference on Computational Intelligence for Measurement Systems and Applications (IEEE CIMSA 2006), pp. 129 - 134, La Coruna, Spain, July 12-14, 2006.

C73. C. Alippi, M. Roveri, "A computational intelligence-based criterion to detect non-stationarity trends", in Proc. IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2006), pp. 5040-5044, Vancouver, Canada, July 16-21, 2006.

C74. C. Alippi, M. Roveri, "An adaptive cusum-based test for signal change detection", in Proc. IEEE International Symposium on Circuits and Systems (IEEE ISCAS 2006), pp. 5752 – 5755, Kos, Greece, May 21-24, 2006.

C75. V. Piuri, M. Roveri, F. Scotti, "Visual Inspection of Particle Boards for Quality Assessment", in Proc. IEEE International Conference on Image Processing (IEEE ICIP 2005), Vol. 3, pp. 521 – 524, Genova, Italy, Sept. 11-14, 2005.

C76. C. Alippi, F. Pessina, M. Roveri, "An Adaptive System for Automatic Invoice-Documents Classification", in Proc. IEEE International Conference on Image Processing (IEEE ICIP 2005), Vol. 2, pp. 526 - 529, Genova, Italy, Sept. 11-14, 2005.

C77. V. Piuri, M. Roveri, F. Scotti, "Computational Intelligence in Industrial Quality Control", in Proc. IEEE International Workshop on Intelligent Signal Processing (IEEE WISP 2005), pp. 4 – 9, Faro, Portugal, Sept. 1-3, 2005.

C78. N. Bianchessi, V. Piuri, G. Righini, M. Roveri, G. Laneve, A. Zigrino, "An optimization approach to the planning of Earth observing satellites ", in Proc. International Workshop on Planning and Scheduling for Space, pp. 207-212, Darmstadt, Germany, June 23-25, 2004.

C79. V. Piuri, M. Roveri, "A Simulation Environment for Concatenated and Turbo Codes Analysis and Optimization", in Proc. IEEE Midwest Symposium On Circuits and Systems (IEEE MWCAS 2003), Vol. 3, pp. 1210-1212, Cairo, Egypt, Dec. 27-30, 2003.

SCIENTIFIC ACTIVITIES

INTERNATIONAL ACTIVITIES

- IEEE Senior Member (since August 2018)

- Associate Editor of the IEEE Transactions on Emerging Topics in Computational Intelligence (since 2019-)

- Associate Editor of the IEEE Transactions on Artificial Intelligence (since 2021)

- Associate Editor of the Elsevier Neural Network Journal (since 2021)

- Associate Editor of the IEEE Computational Intelligence Magazine (since 2022)

- Associate Editor of the IEEE Transactions on Neural Networks and Learning Systems (2013-2020)

- Guest Editor of the IEEE Transactions on Emerging Topics in Computational Intelligence - Special Issue on "Computational Intelligence for Human-in-the-Loop Cyber Physical Systems", 2019.

- Guest Editor of the IEEE Transactions on Neural Networks and Learning Systems - Special Issue on "Recent Advances in Theory, Methodology and Applications of Imbalanced Learning," 2018.

- Chair of the IEEE Computational Intelligence Society (CIS) Neural Networks Technical Committee (2017-2018).

- Chair of the IEEE Computational Intelligence Society (CIS) Technical Activities Strategic Planning Sub-Committee (2020-2021)

- Vice Chair of the IEEE CIS Smart World Technical Committee (2021-2022)

- Chair of the IEEE Computational Intelligence Society (CIS) Senior Member Committee (2020)

- Task Member "AREA 3: TECHNOLOGIES FOR IN-FLIGHT NETWORKING AND EDGE/FOG/CLOUD COMPUTING FOR AIR OPERATIONS" for the EU TEMPEST/ForeSight Project (Caccia Europeo di 5a Generazione) WP5-WP6 (2021-)

- Member of the IEEE Transactions on Neural Networks and Learning Systems (TNNLS) Outstanding Paper Award subcommittee (2019-2021)

- Member of the IEEE Transactions on Emerging Topics in Computational Intelligence (TETCI) Outstanding Paper Award subcommittee (2020-2021)

- Member of the IEEE P7006 - PERSONAL DATA AI AGENT WORKING GROUP. The aim of this group is to define a standard to describe the technical elements required to create and grant access to a personalized Artificial Intelligence (AI) that will comprise inputs, learning, ethics, rules and values controlled by individuals (2017-present).

- Member of the IEEE Computational Intelligence Society (CIS) Neural Networks Technical Committee (2019-2020).

- Member of the IEEE CIS Strategic Planning Committee (2019)

- Member of the IEEE CIS Technical Activities Strategic Planning Sub-Committee (2019)

- Member of the IEEE CIS Membership Strategic Planning subcommittee (2019-2021)

- Evaluator of projects for the following programmes:

  - Independent Research Fund Denmark | Technology and Production (2022)

  - French CHIST-ERA Call 2018 (2019)

  - Austrian R&D funding programme "ICT of the Future" at the Austrian Research Promotion Agency FFG (2016-2017)

- Chair of the IEEE CIS Task Force on Intelligent Cyber-Physical Systems (2017).

- Member of the IEEE CIS Technical Committee on Smart World (2017)

- Member of the IEEE CIS Technical Committee on Data Mining and Big Data Analytics (2017-2018)

- Chair of the IEEE Computational Intelligence Society Pre-College Activities Subcommittee (2016-2017)

- Chair of the IEEE Computational Intelligence Society Student Activities Subcommittee (2014-2015)

- Member of the IEEE Computational Intelligence Society Subcommittee on Webinars (2014-2015)

- Travel Grants Administrator of the IEEE Computational Intelligence Society in (2012 -2013)

- Member of the IEEE Computational Intelligence Society Subcommittee on Research Grants (2012 - 2016)

- Member of the IEEE Computational Intelligence Society Subcommittee on Student Activities (2012-2013,2016,2017)

- Member of the IEEE Computational Intelligence Society Subcommittee on Young Professional (2015-2018)

CONFERENCE ACTIVITIES

- *Program Co-chair* of the International Conference On AI-ML Systems, (AIMLSystems 2022), 12-15 October 2022, Banglore, India.

- *Poster Session Co-Chair* of 2022 IEEE WORLD CONGRESS ON COMPUTATIONAL INTELLIGENCE (IEEE WCCI 2022), Padova, Italy.

- *Keynote Co-Chair and Tutorial Co-Chair* of 2021 IEEE Symposium Series on Computational Intelligence (IEEE SSCI 2021), Orlando, USA.

- *Co-Chair of the Student and Early Career Mentoring Program* at 2020 IEEE WORLD CONGRESS ON COMPUTATIONAL INTELLIGENCE (IEEE WCCI 2020), Glasgow, UK.

- *Member of the Advisory Board* of the 2020 IEEE INTERNATIONAL CONFERENCE ON ARTIFICIAL INTELLIGENCE CIRCUITS AND SYSTEMS (AICAS2020), March 23-25, 2020, Genoa, Italy.

- *Program Chair of* the 2019 International Joint Conference on Neural Networks (IJCNN), Budapest, Hungary on July 14-19, 2019. The conference is organized by the International Neural Network Society (INNS) in cooperation with the IEEE Computational Intelligence Society.

- *Member of the Advisory Committee of the* 17th IEEE International Conference on Pervasive Intelligence and Computing (PICom 2019), 5-8 August 2019, Fukuoka, Japan.

- *Program Co-Chair* of the 4th IEEE Conference on Internet of People (IoP 2018), October 8-12, 2018, Guangzhou, China

- *Publication Chair* of the 2018 IEEE WORLD CONGRESS ON COMPUTATIONAL INTELLIGENCE (IEEE WCCI 2018), Rio de Janeiro, Brazil, 2018.

- *Workshop Co-Chair* of the 2018 IEEE Smart World Congress, October 8-12, 2018, Guangzhou, China

- *Publicity Chair* of the 12th World Congress on Intelligent Control and Automation (WCICA 2016), Guilin, China, June 12-15, 2016.

- *Sponsors & Exhibits Co-Chair* of the 2015 IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2015), Killarney, Ireland, July 12-17, 2015.

- *Publication Chair* of the 2015 IEEE International Conference on Information Science and Technology (ICIST 2015), Changsha, China, April 24–26, 2015.

- *Poster Session Chair* of the 2014 IEEE World Congress on Computational Intelligence (IEEE WCCI 2014), which has been held in Beijing, China, July 6 – 11, 2014.

- *Co-organizer* of the IEEE Symposium on "Computational Intelligence for Embedded and Cyberphysical Systems" (IntECS 2015), at the IEEE Symposium Series on Computational Intelligence (IEEE SSCI 2015), Cape Town, South Africa, Dec. 7-10, 2015

- *Co-organizer* of the IEEE Symposium on "Intelligent Embedded Systems" (IES 2014) at the IEEE Symposium Series on Computational Intelligence (IEEE SSCI 2014), Orlando, USA, Dec. 9-12, 2014

- *Co-organizer* of the Workshop on "Learning strategies and data processing in nonstationary environments" (LEAPS 2013), at the IFIP Artificial Intelligence Applications and Innovations Conference (AIAI 2013), Paphos, Cyprus, Sep. 30 - Oct. 2, 2013.

- *Liaison for Distributed & Collective Intelligence* at the 2011 IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2011).

- *Publicity chair* at the 2011 IEEE International Symposium on Neural Networks (IEEE ISNN 2011).

- *Local Arrangements chair* at the 2009 IEEE International Workshop on Robotic and Sensors Environments (IEEE ROSE 2009).

- *Registration Chair* at the 2009 ENNS International Conference on Artificial Neural Networks (ENNS ICANN 2009).

- *Co-organizer* of the Special Session on "Concept Drift, Domain Adaptation and Learning in Dynamic Environments" at the 2015 IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2015) and at 2014 IEEE World Congress on Computational Intelligence (IEEE WCCI 2014).

- *Co-organizer* of the Special Session on "Intelligent Cyber-physical and Embedded Systems" at 25th Italian Workshop on Neural Networks (WIRN 2015).

- *Organizer* of the Special Session on "Intelligent Embedded Systems" at the 2011 IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2011) and *co-organizer* of the Special Session on "Intelligent Embedded Systems" at 2012 IEEE World Congress on Computational Intelligence (IEEE WCCI 2012) and at the 2013 IEEE International Joint Conference on Neural Networks (IJCNN 2013).

- *Co-organizer* of the Workshop on "Concept Drift & Learning in Non-Stationary Environments" at the 2011 IEEE International Joint Conference on Neural Networks (IEEE IJCNN 2011).

- *Reviewer*:

  - Annual Conference on Neural Information Processing Systems. NeurIPS (2020-present)
  - International Conference on Machine Learning (2022)

- *PC member* of the following events:

  - AIChallengeIoT 2021 Workshop held in conjunction with ACM SenSys 2021
  - The 17th International Conference on Ubiquitous Security (UbiSec 2021)
  - The Thirty-Fourth AAAI Conference on Artificial Intelligence 2020 (AAAI 2020)
  - 28th International Conference on Artificial Neural Networks (ICANN 2019)
  - Workshop EvoLearn-BF held at the 2019 IEEE Congress on Evolutionary Computation (Wellington, New Zealand, June 10-13, 2019)
  - 5th IEEE International Conference on Internet of People (IoP 2019) in 2019
  - The 16th IEEE International Conference on Ubiquitous Intelligence and Computing (UIC 2019)
  - 8th International Conference on Information Science and Technology (ICIST2018) in 2018
  - 15th IEEE International Conference on Ubiquitous Intelligence and Computing (UIC 2018)
  - IEEE International SmartWorld Congress (IEEE SmartWorld) in 2017
  - International Conference on Artificial Intelligence and Soft Computing (ICAISC) in 2017

- o IJCAI 2017 Workshop on Learning in the Presence of Class Imbalance and Concept Drift (LPCICD'17) in 2017;
- o IEEE International Instrumentation and Measurement Technology Conference (IEEE I2MTC) in 2017-2015, 2014, 2012 and 2011.
- o IEEE Symposium Series on Computational Intelligence (IEEE SSCI) in 2016, 2015.
- o International Symposium on Neural Networks (IEEE ISNN) in 2016, 2015 and 2012.
- o IEEE International Workshop on Machine Learning for Signal Processing (MLSP) in 2016 and 2018.
- o International Joint Conference on Artificial Intelligence (IJCAI) in 2015
- o IEEE International Conference on Intelligent Control and Information Processing (IEEE ICICIP) in 2013 and 2016.
- o World Congress on Intelligent Control and Automation (WCICA) in 2016
- o International Conference on Advanced Computing and Intelligent Engineering (ICACIE) in 2016
- o International Conference on Computing in Mechanical Engineering (ICCME) in 2015
- o International Conference on Information Science and Technology (ICIST) in 2015
- o Italian Workshop on Neural Networks (WIRN) in 2015
- o IEEE International Joint Conference on Neural Networks (IEEE IJCNN) in 2014, 2013 and 2011.
- o International Conference on Artificial Neural Network (ICANN) in 2019, 2018, 2014, 2010 and 2009.
- o International Conference on Signal Image Technology & Internet Based Systems (SITIS) in 2015 and 2014.
- o International Conference on Advances in Computing, Communications and Informatics (ICACCI) in 2016,2015.
- o IFIP International Conference on Artificial Intelligence Applications and Innovations (AIAI) in 2016, 2015, 2014, 2013, 2012, 2011.
- o International Symposium on Intelligent Systems Technologies and Applications (ISTA) in 2017 and 2016.
- o IEEE International Symposium on RObotic and Sensors Environments (ROSE) in 2014 and in 2019.
- o International Workshop on Computational Energy Management in Smart Grids (CEMiSG) in 2014.
- o International Workshop on Incremental Classification, concept drift and Novelty detection (ICIaNOV) in 2014.
- o Special Session on "Incremental learning and novelty detection methods and their applications" held at the European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning (ESANN 2014) in 2014.
- o International Conference on Neural Computation Theory and Applications (NCTA/IJCCI) in 2017-2015, 2013, 2012, 2011, 2010.
- o IEEE Symposium on Computational Intelligence in Dynamic and Uncertain Environments (IEEE CIDUE) in 2013.
- o Workshop on Incremental clustering, concept drift and novelty detection (IclaNov) in 2013
- o IEEE International Conference on Smart Instrumentation, Measurement and Applications (IEEE ICSIMA) in 2013.
- o Workshop on Active and Incremental Learning held at the European Conference on Artificial Intelligence (AIL-ECAI) in 2012.
- o IEEE CIS Summer School on Computational Intelligence – Theory and Applications (SS-CITA) in 2014, 2015.
- o Asian Conference on Intelligent Information and Database Systems (ACIIDS) in 2016

NATIONAL ACTIVITIES

- Focal Point of the Use Case "Artificial Intelligence" of the Competence Center "MADE in Italy 4.0" of the Politecnico di Milano (2021-present)

- Scientific Advisor for the Cluster TAV "Salute e Lifescience", Regione Lombardia (2021-present)

- Scientific Advisor for the Cluster TAV "Connettività e Informazione", Regione Lombardia (2021-present)

- Member of the Faculty Board of the Ph.D. Programme in "Data Analytics and Decision Sciences" (2018-present)

- Member of the commission for the admission to the Laurea Magistrale in Ingegneria Informatica - Master in Computer Science and Engineering, Corso di studi in Ingegneria Informatica (2020-present).

- Member of the commission for the admission to the Ph.D. Programme in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY, Cycle XXXV (2019).

- Co-Focal Point of the Use Case 12 "Big Data Analytics" of the Competence Center "MADE in Italy 4.0" of the Politecnico di Milano (2018-2020)

- Focal Point of the Use Case "Artificial Intelligence of the Competence Center "MADE in Italy 4.0" of the Politecnico di Milano (2021-present)

- *Research Manager in* the "Osservatorio Artificial Intelligence" of the Politecnico di Milano (2017-present).

- *Member of the technical committee* of the "Osservatorio Internet of Things" of the Politecnico di Milano (2012-2013).

- *Member of the Commission for Industry 4.0 of the* Dipartimento di Elettronica, Informazione e Bioingegneria in 2018.

- Expert Reviewer of the "Commissione della gara" funded by Trenord "per l'affidamento del servizi IT di Service Desk, Locazione Operativa e gestione, assistenza tecnica e manutenzione postazioni di lavoro" (2019-2020).

- Expert Reviewer for the Provincia Autonoma Di Trento for the Evaluation of "Industrial Research Projects 2020".

- Reviewer of the Bando FAR 2019 of the "Università degli Studi di Modena e Reggio Emilia" in 2019.

- Node Coordinator "Politecnico di Milano" - CINI Lab. Smart Cities & Communities (2015-2019).

- Co-coordinator of the Wireless Embedded System Lab (WemSy) located at the Lecco Campus of Politenico di Milano (2019 – present).

PLENARY AND TECHNICAL TALKS

- Plenary Talk on "Tiny Machine Learning and Edge AI" at the 2022 International Conferences on Computational Intelligence and Data Analytics (ICCIDA 2022), Jan. 8-9, 2022, Hyderabad, India.

- Plenary Talk "Is Tiny Deep Learning the new Deep Learning?" at the 2020 Workshop on "Incremental classification and clustering, concept drift, novelty detection in big/fast data context" held in conjunction with the 20th IEEE International Conference on Data Mining, November 17-20, 2020.

- Plenary Talk "Intelligence for Embedded Systems" at the IEEE-Sponsored 5th International Conference on Soft Computing and Pattern Recognition (IEEE SoCPaR 2014).

- Plenary Talk "Learning models in nonstationary environments: the Just-In-Time approach" at the Workshop on Active and Incremental Learning held at 20th European Conference on Artificial Intelligence, Montpellier, France, August 27-31, 2012

- Technical Talk "Tiny Machine Learning: deeper and wider machine learning at the edge" at the AI-EXPLAINED event organized by STMicroelectronics, March. 23, 2022.

- Technical Talk "Is privacy-preserving computation the next big thing in machine and deep learning?" at the IBM Accelerated Discovery Seminar organized by IBM Research Zurich, Feb. 1, 2022.

- Keynote Talk on "Tiny Machine Learning and Edge AI" at the 2022 International Conferences on Computational Intelligence and Data Analytics (ICCIDA 2022), Jan. 8-9, 2022, Hyderabad, India.

- Technical speaker on "Artificial Intelligence and Cloud" at the "Tomorrow's Data Center Forum" organized by VERTIV on March 30, 2021 (Virtual Event).

- Technical Talk "TinyML: the AI solution for the computing everywhere", delivered at the "John McCarthy Memorial Lecture (JML)" for the year 2020 organized by the IEEE CIS Chapter, Hyderabad Section, India. R10. December 17, 2020.

- Technical Talk on "Internet of Smart Things: where machine learning meets embedded systems" at the 6th Edition of ASTDay: Innovation Domains in IoT, Milano (Italy), February 22, 2018

- Technical Talk on "IoT and AI: l'unione fa la forza", Convegno Smart Home dell'Osservatorio Internet of Things, Politecnico di Milano, Milano (Italy), February 16, 2018

- Technical Talk on "From machine learning to learning machines (and back)" at the AMD and Supermicro event organized by Digital4Biz, Rome (Italy), November 22, 2017

- Technical Talk on "From machine learning to learning machines (and back)" at the Intel and Supermicro event organized by Digital4Biz, Milano (Italy), September 27, 2017

- Technical Talk on "Sfide ed opportunità del mondo cyber-fisico" at Technology Hub – Elettronica e IoT Hub, Milano (Italy), June 7, 2016

- Seminar on "Intelligent Cyber-Physical Systems based on self-adaptive heterogeneous sensor technological platform" at STMicroelectronics, Agrate (Italy), Nov. 19, 2015

- Invited Talk "Intelligence for Embedded and Cyber-physical Systems: from Theory to Practice" at STMicroelectronics, Agrate (Italy), May 15, 2015

- Invited Talk "Intelligent Embedded Systems" at Larus Technologies, Ottawa (Canada), May 7, 2014

SEMINARS IN SUMMER SCHOOLS

- Seminar at the 2021 IEEE CIS Summer School on Data-Driven Artificial/Computational Intelligence. The topic of the talk is "TinyML: theory and technology".

- Speaker at the 2021 Summer School of Information Engineering (SSIE) – "Silvano Pupolin". The topics of the talks are "Learning in non-stationary environments" and "Artificial intelligence for embedded and edge computing systems".

- Speaker at the 2014 IEEE CIS / REGIM-Lab. Summer School on Computational Intelligence – Theory and Applications (SS-CITA'2014). The topic of the talk is "Supervised learning in stationary and non-stationary environments"

PANELIST

- Panelist at the Panel on "Machine Learning and Big Data: Where do they fit in CPS?" organized at 2018 ACM/IEEE International Conference on Information Processing in Sensor Networks Porto (IPSN 2018), Portugal, April 11-13, 2018.

AWARDS

- **"Outstanding Associate Editor" Award** from the IEEE Transactions on Emerging Topics in Computational Intelligence in 2021.

- **Outstanding Computational Intelligence Magazine Paper Award** from the IEEE Computational Intelligence Society in 2018 for the paper "Learning in Nonstationary Environments: A survey", by Gregory Ditzler, Manuel Roveri, Cesare Alippi and Robi Polikar, IEEE Computational Intelligence Magazine, vol. 10, no. 4, pp. 12-25, Nov. 2015

- **Outstanding Transactions on Neural Networks and Learning Systems Paper Award** from the IEEE Computational Intelligence Society in 2016 for the paper "Just-in-Time Classifiers for Recurrent Concepts" by C. Alippi, G. Boracchi and M. Roveri, IEEE Transactions on Neural Networks and Learning Systems, Vol. 24, No. 4, pp. 620 – 634, April 2013.

- **Best Regular Paper Award at the International Neural Network Society Conference on Big Data** in 2016 for the paper "Designing HMM Models in the Age of Big Data" by C. Alippi, S. Ntalampiras and M. Roveri, INNS Conference on Big Data, October 23-25, 2016, Thessaloniki, Greece, 2016.

- **"Outstanding reviewer of 2008" Award** from the IEEE Instrumentation and Measurement Society

GRANT

- Recipient of the NVIDIA GPU Grant for the project "Jetson EmbEdded Platform for Fog Computing (JEEP)" from NVIDIA Corporation in 2017.

TECNOLOGY TRANSFER

- **SPIN-OFF of Politecnico di Milano**
  - **DHIRIA**. The research collaboration with two Italian SMEs, i.e., Subcom s.r.l. and Catchy s.r.l., in the field of adaptive and privacy-preserving machine and deep learning computation led to the decision to found an innovative company called DHIRIA. The goal of DHIRIA is the design and development of a Cloud-based platform to provide privacy-preserving machine and deep learning "as-a-service" solutions. The founder team (Manuel Roveri, SubCom s.r.l. and Catchy

s.r.l.) activated the spin-off accreditation process with Politecnico di Milano in June 2021. **In July 2021 Politecnico di Milano officially approved the accreditation of DHIRIA as Spin-Off**. The DHIRIA company was founded in October 2021. SubCom s.r.l. decided to fund the spin-off DHIRIA with 300K Euro (which will be used also to activate two PhD scholarships in the PhD on Information Technology).

- ▪ **PATENTS**
  - ○ A.Basso, M.Galimberti, C.Alippi, G.Boracchi, M.Roveri, Device and detection procedure, Registered 9 June, 2017. MEC4P6IT, Italian validity
  - ○ A.Basso, M.Galimberti, C.Alippi, G.Boracchi, M.Roveri, Device and detection procedure, Registered 9 June, 2017. MEC4P5IT, Italian validity
  - ○ A.Basso, M.Galimberti, C.Alippi, G.Boracchi, M.Roveri, Device and detection procedure, Registered 9 June, 2017. MEC4P4IT, Italian validity
  - ○ C.Alippi, M.Roveri, G.Viscardi, "Sistema per l'erogazione automatica di farmaci", ITALIA - Concessione Brev. d'Inv. n. 102016000122814 dep. il 2.12.16

SCIENTIFIC RESPONSIBILITY IN ITALIAN/EU PROJECTS

The funding for the Politecnico di Milano has been specified only for those projects in which Manuel Roveri had the role of coordinator or co-coordinator of the Research Unit (RU)

- ▪ **RECKON (INAIL BRIC PROJECT) : Years** 2020-2022 - **Role within the project: Co-Coordinator of the DEIB RU. Funding for POLIMI 909K euro (DEIB RU 303K euro, MEC RU 303K euro, DIG RU 303K euro)**

  The project aims to define, develop and validate a hub (designed as a "network connection center") of laboratories, databases and companies for the systematic analysis of the accident-at-work risks and their causes, as well as an understanding of the operator-machine-environment interactions for monitoring, diagnostics and integrated prevention activities. The Research Unit (RU) I co-coordinated aims at designing and developing an intelligent pervasive system for the real-time detection of potentially-dangerous situations and near-miss accidents-at-work.

- ▪ **SIMPSS (Founded by the Region of Lombardy – Bando Smart Living 2017) Years: 2017-2019 - Role within the project: Coordinator of the POLIMI RU. Funding for the POLIMI RU: 86K euro.**

  The project aims at designing and developing distributed intelligent cyber-physical systems for the structural monitoring of buildings and critical infrastructure systems. The proposed intelligent cyber-physical systems will allow the continuous structural monitoring to identify early signs/events so as to support a predictive diagnosis of the future state of the building/critical infrastructure system. The RU I coordinated in this project designed and developed the intelligent cyber-physical system.

  The technological outcomes of this project refer to the deployment of the distributed intelligent cyber-physical system on communication towers of the MGH and on buildings the Università di Milano Bicocca in September 2019.

- ▪ **GAUCHO (PRIN PROJECT): Years** 2017-2019 - **Role within the project: WP leader.**

  The project aims at designing and developing distributed intelligent cyber-physical systems for the structural monitoring of buildings and critical infrastructure systems. The proposed intelligent cyber-physical systems will allow the continuous structural monitoring to identify early signs/events so as

to support a predictive diagnosis of the future state of the building/critical infrastructure system on which it is installed.

- **iSENSE** (EU STREP project) Years: 2011-2013 - Role within the project: **WP leader**

  The aim of the project was to develop an intelligent data processing framework for analyzing and interpreting data collected from systems of systems comprising sensor and actuator networks such that faults are promptly detected, isolated, identified and accommodated for in future decisions or actions. In particular, the research activity I coordinated focused on the design and development of cognitive fault diagnosis systems able to exploit temporal and spatial functional dependencies among acquired datastreams to improve fault detection, isolation and identification in complex sensor/actuator networks.

- **MIARIA** (INTERREG EU project Italy-Switzerland) Years: 2009-2012 - Role within the project: **WP leader**

  The project focused on the design of innovative distributed systems for the collection and transmission of environmental data –and commands back- to a second-generation monitoring control room, the subsequent data aggregation and analysis for designing dynamic risk maps in alpine environments subject to hydrogeological risks. In particular, the research activity I co-coordinated focused on the design and development of novel hybrid architectures and hardware platforms, adaptive and intelligent mechanisms, robust communication protocols, and efficient energy management solutions.

  The technological outcomes of this project are the design and development of a rock collapse forecasting system that has been deployed in several critical areas of the Italian-Swiss Alps (Torrioni di Rialba, July 2010; Ticino, Switzerland, August 2011; Gallivaggio, July 2012) and the design and development of an intelligent landslide monitoring system that has been deployed in critical slopes of the Italian Alps (Torrioni di Rialba, July 2011; Premana, August 2012).

- **Checkpoint integrato** (Settore strategico ICT – Founded by the Region of Lombardy) Years: 2012-2014 - Role within the project: **WP leader**

  The aim of the project is the design and development of a new generation of security checkpoints, called "Integrated Checkpoint", where different technological solutions for the detection of hazardous materials (e.g., explosives) both in luggage and on people coexist and cooperate. The main characteristic of the integrated checkpoint is the capability to exploit all these technological solutions to improve the efficiency and the effectiveness of the monitoring action. Within this project, the research activity I coordinated focused on the design, the development and the testing of advanced algorithms for the detection of explosives based on computational intelligence techniques and novel filtering solutions to improve the signal-to-noise ratio.

- **SEMAT** (Italian-Australian Project) Years: 2007-2009 - Role within the project: Task leader

  The project aimed at developing an environmental monitoring framework for the monitoring of the underwater luminosity and temperature, information necessary to derive the health status of the coral reef as well as providing quantitative indications related to cyclone formations in tropical areas. In particular, my involvement in the research activity focused on the design and development of a WSN–based solution characterized by energy harvesting, robustness with respect to a large class of perturbations and real-time adaptation to network topology variations.

  The technological outcome of this project was the design and development of a wireless sensor network-based system for the monitoring of aquatic environments that has been deployed in Queensland, AUS (Nov. 2007).

- **PROMETEO** (Politecnico di Milano strategic research project) Years: 2007-2009 - Role within the project: Task leader

  Prometeo was a strategic research project of Politecnico di Milano focusing on civil protection and homeland security (public protection) topics. The project, which involved a relevant number of partners from 8 departments, aimed on our side at studying and developing ICT-based methodologies and technologies for risk prevention and emergency management. Within this project, my research activity focused on the design of ad-hoc innovative devices and sensors, advanced algorithms for image and signal processing and emergency and monitoring rooms of second generation.

  The technological outcome of this project is the design and development of a rock collapse forecasting system that has been deployed on the S. Martino Mountain, April 2010.

SCIENTIFIC RESPONSIBILITY IN JOINT RESEACH CENTERS

- **POLIMI JRC MATT : Years** 2021-2023 - **Role within the project: Coordinator of the DEIB RU. Funding for DEIB POLIMI 100K euro**

  The JRC MATT is a joint research center of Politecnico di Milano on metal semi-finished products, their production, processing and their derivatives. The goal is to promote and develop activities and initiatives to support the competitive, innovative and know-how growth of its members. In particular the Research Unit (RU) I coordinated aims at designing and developing novel machine-learning as-a-service solutions for the analysis of production systems aiming at improving the quality of production.

FUNDINGS AND CONTRACTS

Research Contracts

- Research contract for the project "Design and development of machine and deep learning models for embedded devices" with Luxottica S.p.a. (2022). Value of the contract: 47K euro. Role: Project Coordinator.

- Research contract for the project "Tiny federated anomaly detection" with Sensoworks s.r.l. (2022). Value of the contract: 60K euro. Role: Project Coordinator.

- Research contract for the project "Design and development of a prototype platform for the SmartWave framework" with University of Palermo (2022). Value of the contract: 150K euro. Role: Project Co-Coordinator.

- Research contract for the project "Definition of a new architecture for PLC in the HVAC/R field" with Carel S.p.a. (2021). Value of the contract: 18K euro. Role: Project Coordinator.

- Research contract for the project "Classification systems for recognition of people and children in cars" with Digimediacom s.r.l. (2020). Value of the contract: 38K euro. Role: Project Coordinator.

- Research contract for the project "Study and development of predictive models for the prediction of sales of mural products" with TIGROS S.p.a. (2020). Value of the contract: 22K euro. Role: Project Coordinator.

- Research contract for the project "Study and implementation of a prototype platform to support clinical research" with Tecniplast S.p.a. (2020). Value of the contract: 50K euro. Role: Project Co-Coordinator.

- Research contract for the project "Research and development of innovative environmental monitoring systems to be used in civil and industrial fields" with 3E-Project s.r.l. (2020). Value of the contract: 33K euro. Role: Project Coordinator.

- Research contract for the project "New methodologies and techniques for an analysis and forecasting platform", with SubCom srl (2019). Value of the contract: 48K euro. Role: Project Coordinator. This project is part of the project CATCH4.0 funded by Programma Operativo Nazionale (PON) "Imprese e competitività" FESR 2014/2020.

- Research contract for the project "Definition of Intelligent Tools and Services for the Optimization of Production Processes" with Codermine srl (2019). Value of the contract: 55K euro. Role: Project Coordinator. This project is part of the project TD4.0 funded by Programma Operativo Nazionale (PON) "Imprese e competitività" FESR 2014/2020.

- Research contract for the design of "Intelligent Mechanisms for the Internet of Things" with Joule 4.0 (2018). Value of the contract: 20K euro. Role: Project Coordinator

- Research contract for the "Design and development of a visual inspection system for the production quality assessment of wood boards" (2018) with Vilte Legnami s.r.l. Value of the contract: 25K euro. Role: Project Coordinator

- Research contract for the "Study of machine learning techniques and mechanisms and of optimization algorithms and mechanisms to support the prediction of heterogeneous time series and the optimization of purchase scheduling and logistic management" with Fratelli Rotta (2018). Value of the contract: 32.5K euro. Role: Project Co-Coordinator

- Research contract for the "Study of an interface between MD e ACPI based on BLE technology" with Nettronix S.r.l. (2018). Value of the contract: 4K euro. Role: Project Coordinator

- Research contract for the "Study of machine learning techniques for the prediction of pipeline corrosion" with Eni (2018). Value of the contract: 55K euro. Role: Project Co-Coordinator

- Research contract for the "Study and Testing of the accelerometric behavior of vacuum pumps" with PVR Vacuum Design s.r.l. (2018). Value of the contract: 10K euro. Role: Project Coordinator

- Research contract for the "Event detections for Intelligent Monitoring enabled by Artificial Neural Networks applied to client-server architectures featuring multiple X-NUCLEO sensors" with STMicroelectronics S.r.l. (2016). Value of the contract: 30K euro. Role: Project Coordinator

- Research collaboration for the "Design and development of tracking devices for migratory animals" with Università Degli Studi Di Milano - Bicocca (2016). Value of the contract: 3K euro. Role: Project Coordinator

- Research contract for the "Technology transfer and support to the design of classification systems based on computational intelligence solutions (deep learning) for logistics applications" with MecTho s.r.l (2016). Value of the contract: 20K euro. Role: Project Co-Coordinator

- Research contract for the "Development of embedded systems endowed with online and secure reprogramming mechanisms" with Res.En. s.r.l. (2013). Value of the contract: 25K euro. Role: Project Coordinator

- Research contract for the "Development of embedded systems for sensor readings in environmental monitoring applications" with Res.En. s.r.l. (2012). Value of the contract: 15K euro. Role: Project Coordinator

Funded PhD Scholarships

- PhD Scholarship in the Ph.D. Programme in Information Technology funded by Dhiria s.r.l. "Green-is-all-you-need in privacy-preserving machine and deep learning" (2022 – 2025). Value of the funding: 79K euro. Role: PhD Supervisor.

- PhD Scholarship in the Ph.D. Programme in Information Technology funded by Digimediacom s.r.l. "Embedded and Edge AI for UWB-radar based detection and recognition of living" (2021 – 2024). Value of the funding: 79K euro. Role: PhD Supervisor.

- PhD Scholarship in the Ph.D. Programme in Information Technology funded by ENI S.p.a. "Machine Learning for corrosion prediction" (2018 – 2021). Value of the funding: 79K euro. Role: PhD Supervisor.

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TEACHING ACTIVITIES

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DOCENZA IN CORSI DI LAUREA

- A.A. 2021/22, "Computing Infrastructures" (5 CFU) Scuola di Ingegneria Industriale e dell'Informazione, Politecnico di Milano. (Students' Evaluation: Not Available)

- A.A. 2021/22, "Informatica e Elementi di Informatica Medica" (7 CFU) Scuola di Ingegneria Industriale e dell'Informazione, Politecnico di Milano. (Students' Evaluation: Not Available)

- A.A. 2021/22, "Informatica Grafica" (3 CFU) Scuola di Architettura Urbanistica Ingegneria delle Costruzioni, Politecnico di Milano. (Students' Evaluation: 3.5/4)

- A.A. 2020/21, "Computing Infrastructures" (5 CFU) Scuola di Ingegneria Industriale e dell'Informazione, Politecnico di Milano. (Students' Evaluation: 3.0/4)

- A.A. 2020/21, "Informatica e Elementi di Informatica Medica" (7 CFU) Scuola di Ingegneria Industriale e dell'Informazione, Politecnico di Milano. (Students' Evaluation: 3.5/4)

- A.A. 2020/21, "Informatica Grafica" (3 CFU) Scuola di Architettura Urbanistica Ingegneria delle Costruzioni, Politecnico di Milano. (Students' Evaluation: 3.7/4)

- A.A. 2019/20, "Computing Infrastructures" (5 CFU) Scuola di Ingegneria Industriale e dell'Informazione, Politecnico di Milano. (Students' Evaluation: 3.2/4)

- A.A. 2019/20, "Informatica e Elementi di Informatica Medica" (7 CFU) Scuola di Ingegneria Industriale e dell'Informazione, Politecnico di Milano. (Students' Evaluation: 3.4/4)

- A.A. 2019/20 - "Informatica Grafica" (3 CFU) Scuola di Architettura Urbanistica Ingegneria delle Costruzioni, Politecnico di Milano. (Students' Evaluation: 3.4/4)

- A.A. 2018/19, "Computing Infrastructures" (5 CFU) Scuola di Ingegneria Industriale e dell'Informazione, Politecnico di Milano. (Students' Evaluation: 3.2/4)

- A.A. 2018/19, "Informatica e Elementi di Informatica Medica" (7 CFU) Scuola di Ingegneria Industriale e dell'Informazione, Politecnico di Milano. (Students' Evaluation: 3.6/4)

- A.A. 2018/19 - "Informatica Grafica" (3 CFU) Scuola di Architettura Urbanistica Ingegneria delle Costruzioni, Politecnico di Milano. (Students' Evaluation: 3.6/4)

- A.A. 2017/18, "Computing Infrastructures" (5 CFU) Scuola di Ingegneria Industriale e dell'Informazione, Politecnico di Milano. (Students' Evaluation: 2.9/4)

- A.A. 2017/18, "Informatica e Elementi di Informatica Medica" (7 CFU) Scuola di Ingegneria Industriale e dell'Informazione, Politecnico di Milano. (Students' Evaluation: 3.5/4)

- A.A. 2017/18 - "Informatica Grafica" (3 CFU) Scuola di Architettura Urbanistica Ingegneria delle Costruzioni, Politecnico di Milano. (Students' Evaluation: 3.5/4)

- A.A. 2016/17, "Informatica e Elementi di Informatica Medica" (7 CFU) Scuola di Ingegneria Industriale e dell'Informazione, Politecnico di Milano. (Students' Evaluation: Alta)

- A.A. 2016/17 - "Informatica Grafica" (3 CFU) Scuola di Architettura Urbanistica Ingegneria delle Costruzioni, Politecnico di Milano. (Students' Evaluation: Alta)

- A.A. 2015/16, "Informatica e Elementi di Informatica Medica" (7 CFU) Scuola di Ingegneria Industriale e dell'Informazione, Politecnico di Milano. (Students' Evaluation: Alta)

- A.A. 2015/16 - "Informatica Grafica" (3 CFU) Scuola di Architettura Urbanistica Ingegneria delle Costruzioni, Politecnico di Milano. (Students' Evaluation: Alta)

- A.A. 2014/15 - "Informatica Grafica" (3 CFU) Scuola di Architettura Urbanistica Ingegneria delle Costruzioni, Politecnico di Milano. (Students' Evaluation: Alta)

- A.A. 2013/14 - "Informatica Grafica" (3 CFU) Scuola di Architettura Urbanistica Ingegneria delle Costruzioni, Politecnico di Milano. (Students' Evaluation: Alta)

- A.A. 2012/13 - "Informatica Grafica" (3 CFU) Scuola di Architettura Urbanistica Ingegneria delle Costruzioni, Politecnico di Milano. (Students' Evaluation: Alta)

- A.A. 2011/12 - "Informatica Grafica" (3 CFU) Scuola di Architettura Urbanistica Ingegneria delle Costruzioni, Politecnico di Milano. (Students' Evaluation: Alta)

- A.A. 2010/11 - "Informatica Grafica" (3 CFU) Scuola di Architettura Urbanistica Ingegneria delle Costruzioni, Politecnico di Milano. (Students' Evaluation: Media-Alta)

- A.A. 2009/10 - "Informatica Grafica" (3 CFU) Scuola di Architettura Urbanistica Ingegneria delle Costruzioni, Politecnico di Milano. (Students' Evaluation: Media)

DOCENZA IN PROGRAMMI DI DOTTORATO

- A.A. 2021/22, "Embedded and Edge AI", (5 CFU) in the Ph.D. program in Information Technology, Politecnico di Milano, Milano.

- A.A. 2021/22, "Time-series exploration with machine and deep learning: from theory to practice", (5 CFU) in the Ph.D. program in Data Analytics and Decision Sciences, Politecnico di Milano, Milano, Italy.

- A.A. 2016/17, "Intelligence for Embedded Systems" (5 CFU) in the Ph.D. program in Information Technology, Politecnico di Milano, Milano, Italy.

- A.A. 2015/16, "Cognitive Cyber-physical Systems: from theory to practice" (5 CFU) in the Ph.D. program in Information Technology, Politecnico di Milano, Milano, Italy (in conjunction with Prof. C. Alippi).

- A.A. 2014/15, "Intelligence for Embedded Systems" (5 CFU) in the Ph.D. program in Information Technology, Politecnico di Milano, Milano, Italy.

Supervisor of PhD Students

- Supervisor of 5 PhD Students in the Doctoral Program in Information Technology at Politecnico di Milano
  - *Alessandro Falcetta*, 2021 - present
    Thesis Title: "Privacy-preserving Machine Learning."
  - *Massimo Pavan*, 2021 - present
    Thesis Title: "Adaptive Tiny Machine Learning for UWB data"
  - *Simone Disabato*, 2018 - 2022
    Thesis Title: "Deep and Wide Tiny Machine Learning"
    Final Degree: LODE
  - *Giuseppe Canonaco*, 2018 - 2022
    Thesis Title: "Learning in non-stationary environments: from a specific application to more general algorithms"
    Final Degree: LODE
  - *Francesco Trovò*, 2012 - 2014
    Thesis Title: "Cognitive fault diagnosis for sensor networks"
    Final Degree: LODE
- PhD Student Co-Supervisor at the *Alta Scuola Politecnica*, Politecnico di Milano – Politecnico di Torino
  - *Ario Sadafi*, 2015 - end

OTHER TEACHING ACTIVITIES

- Reviewer of the following PhD thesis:

  - "*Design for Energy-efficient and Reliable Fog-assisted Healthcare IoT Systems*" of the Faculty of Science and Engineering at the University of Turku, Finland (2018)

  - "Methods in Multi-Source Data-Driven Transfer Optimization", School of Computer Science and Engineering, Nanyang Technological University (2019)

  - "Microring-Resonator-Based Switch Architectures for Optical Networks" in the Dottorato di Ricerca in "Ingegneria Elettronica e delle Comunicazioni" (XXVII Ciclo) of the Politecnico di Torino (2015)

- Member of the "Board of Examiners of ELECTRONICS AND COMMUNICATIONS" for the award of the title of research doctor in ELECTRONICS AND COMMUNICATIONS ENGINEERING - Politecnico di Torino, Italy, Jan. 16, 2015

- Member of the "Doctoral Examination Committees" of the Ph.D. School in Computer Science at the University of Pisa, Florence and Siena, Italy, July 2021.

- Advisor/Co-Advisor of more than 40 Bachelor/Master Theses at Politecnico di Milano

- Tutor of a Master Student enrolled in a Stage in ST Microelectronics – Agrate (MI), Italy (April 2015 - October 2015) on "Time-varying Neural Networks for heterogeneous sensing systems"

- Reviewer of 1 Ms Thesis for the UNIVERSITY OF LUGANO - ALaRI INSTITUTE

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Milano, Italy

July 25, 2022

Manuel Roveri

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