Curriculum Vitae of Emilio Sardini

MAIN ROLES

In 1983 he obtained the degree in Electronic Engineering from the Politecnico of Milan. Since 1984 Emilio Sardini carries out full time research, teaching and management activities at the University' of Brescia. He also had management activity at the University of Bergamo and he has a lot of professional contacts worldwide, mainly with The Universitè Pierre Marie Curie (UPMC Paris) and with the Universidad Politecnica de Catulunia (UPC, Barcelona,Spain). He also has a good scientific international reputation in the field of sensors, front end electronics (analog and digital) and electronic instrumentation. Some of the main topics are: ultrasonic sensors, capacitance transducers and related high-resolution instrumentation measurement, electronic instrumentation for the Barkhausen noise measurement; instrumentation for the measurement of noise due to piezoresistive films deposited on metal substrates; telemetry trasmission of measurement information between sensor and electronics; autonomous sensors (wire-less and battery-free) for temperature measurement, wind velocity and for Force Measurements in Human Knee Implants. He published more than 100 document on international journals or international conferences. He also managed research projects and industrial technology transfer activities.

PROFESSIONAL CARIERS

Previous positions:

01/03/1986 - 31/10/1998 Researcher at the Department of Electronics for Automation of the Faculty of Engineering, University of Brescia;
01/11/1989 - 31/10/1997 member of the Integrated Academic Senate of the University of Brescia;
01/11/1998 - 31/10/2006 Associate Professor at the Department of Electronics for Automation, Faculty of Engineering, University of Brescia;
01/11/2001 - 31/10/2004 member of the Board of Governors of the University of Brescia;
01/11/2001 - 31/10/2009 Chancellor's delegate by the University of Brescia of the Board of School SILSIS section of Bergamo Brescia (Lombard Interuniversity School for the higher education);
01/11/2007 up to 31/10/2010 member of Mechatronics PhD Faculty at the University of Bergamo;
01/11/2009 – 31/10/2012 Deputy Dean of the Faculty of Engineering, University of Brescia.

Present Position

01/11/2006 Full professor at the Department of Information Engineering (formerly previously Department of Electronics for Automation), Faculty of Engineering, University of Brescia;
01/01/2012 Head of the Department of Information Engineering
01/01/2012 Member of the Academic Senate of the University of Brescia.
01/07/2009 Coordinator of the PhD "Technology for Health";

Related roles:

He is or has been in charge of the following functions and / or assignments:

- Reviewer for several international journals in the field of sensors, front end electronics (analog and digital) and electronic instrumentation;
- Coordinator of teaching activities at the University of Brescia and at the University of Bergamo;
- Member of several national boards to recruit permanent staff for university professor position;
- Supervisor of cooperation agreements and / or research contracts with the Joint Research Centre (JRC) of the European Commission at the headquarters located in Petten (Netherlands) and Ispra;

TEACHING ACTIVITIES

Emilio Sardini has been working in education and he held or he is holding the following courses:

a) in the academic year 85/86: "Industrial Electronics" and "Automatic Instrument for Industrial Measurements";
b) from 86/87 to 93/94: "Electrical Measurements";
c) from 91/92 to 01/02: “Instrumentation and Electronic Measurements ".
d) from 92/93 to 96/97: "Applied Electronics" (96/97 in the academic year the course has changed its name to "Electronics");
g) from 99/00 up 01/02: “Electrical and Industrial Measuring Instruments DU ";
h) from 02/03 up 05/04: “Electrical and Electronics Instrumentation”;
i) from 02/03 up 08/09: "Electronics and Instrumentation B”;
j) from 03/04 up 07/08: "Instrumentation for control of production";
k) from 03/04 up 08/09: "Teaching of digital instrumentation and microprocessor systems" at the University of Bergamo;
l) in the academic years 03/04, 04/05 and 05/06: "Elements of electronic instrumentation”;
m) in the academic years 04/05 and 05/06, "Digital instrumentation and microprocessor systems."
q) from 06/07 up to 08/09: "Elements of electronic instrumentation;
r) from 08/09: Sensors
s) from 04/05: Microprocessor based instrumentation (formerly previously "Digital instrumentation and microprocessor systems.")

He is or has been also responsible of several theses (both Master or Doctorate). Finally, he held various seminars and courses sponsored by public and private institutions.

RESEARCH

The research activity of Emilio Sardini has been developed at the Department of Electronics for Automation University of Brescia, in the laboratories of electronic instrumentation and sensors, where, by their constitution, he conducts research in the fields of instrumentation, both analog or digital, sensors for physical quantities. In particular the research of Emilio Sardini ranges on various issues relating to measuring instruments or sensors and can be classified mainly into four main areas:

1) measurement instrumentation of physical quantities;
2) instrumentation for the characterization of sensors;
3) sensors for measuring physical quantities;
4) autonomous sensors.
Listed below are reported some details about the research topics carried out. In the field of the instrumentation for the measurement of physical quantities:

1.a) Measurement of distances and angular positioning of robotic arms using ultrasonic techniques for industrial applications;
1.b) Dimensional measurements of mechanical parts using optical techniques;
1.c) **Apparatus** for high resolution signal conditioning provided by capacitive transducers for industrial applications;

1.d) Instrumentation for characterizing the structural properties of metals by measuring the Barkhausen noise.

In the field of instrumentation for the characterization of sensors:
2.a) Instrumentation to measure noise from piezoresistive films deposited on metal substrates;
2.b) Instrumentation for calibration of accelerometers at low frequencies;
2.c) instrumentation for the characterization of SiC films.

As part of the sensors for the measurement of physical quantities:
3.a) Development of acceleration sensors in thick film, deposited on metallic substrate;
3.b) Development of a thermal flow sensor of inclination;
3.c) Development of planar inductive sensors for industrial applications;
3.d) Position sensors using capacitive transduction;
For what concern the autonomous sensors:
4.a) Development of techniques for contactless transmission of information between the measuring sensor and conditioning electronics.
4.b) Development of contactless techniques for the activation and reading of (micro) resonant sensors
4.c) Development of autonomous sensors for measuring temperature and wind speed
4.d) Development of Sensor for measuring forces in a knee prosthesis.

He also conducted research including in the following two areas of related measures:
5.a) Instrumentation for automatic analysis of biomedical quantities;
5.b) Measurement of the effects induced by electromagnetic interference conveyed through the power cable of operational amplifiers.

TECHNOLOGY TRANSFER ACTIVITIES

Emilio Sardini participates or coordinates research commissioned by external institutes (public or private). These activities regards the following themes:

a) Measurement of torque for tightening bolts.
b) Study the behavior of solenoid
c) Instruments for the measurement of Barkhausen noise.
d) impedance measurements on specific thermal textile fabric.
e) Development of sensors for automation machines producing socks.
f) Development of sensors for automation machinery for the production of buttons.
h) Development of innovative electronic circuit for pressure transducers.
i) Development of a digital system to control a pneumatic solenoid.
k) Analysis and design and production of identification devices (RFID) for unconventional applications.
l) Electromagnetic sensors.

MANAGEMENT OF RESEARCH PROGRAMS

Emilio Sardini has been the Scientific Coordinator of the project "GLOREHA HOME TC Home device for the support of the rehabilitation of patients with deficits in the hand" .The project has been submitted to the Call: PROGETTI DI RICERCA INDUSTRIALE E SVILUPPO SPERIMENTALE NEI SETTORI STRATEGICI DIREGIONE LOMBARDIA E DEL MINISTERO DELL'ISTRUZIONE, DELL'UNIVERSITA' E DELLA RICERCA DI CUI AL DECRETO N. 7128 DEL 29 LUGLIO 2011. The project won a financial grant amounting to € 1,180,399.57. The University of Brescia, that is the university of the principal investigator, participates in the project along with IDROGENET S.R.L., CASA DI CURA HABILITA S.P.A., GREINER - S.P.A., FONDAZIONE SALVATORE MAUGERI CLINICA, POLIBRIXIA S.R.L.

Emilio Sardini has been the Scientific Coordinator for the University of Brescia of research project "ADAPTIVE - Block Approach and adaptive to the Digital Factory " one of the four project approved in the "Smart Factory" Cluster. The University of Brescia participates together with SCM Group Spa, Spa AVIO, SIR Spa, CTC Srl, ITALY COPAN Spa, SCAGLIA INDEVA Spa, Spa Balluff, AEA-GROUP Srl LOCCIONI, COSBERG Spa, Spa MASMEC, EICAS AUTOMATION Spa, University of Modena and Reggio Emilia, University of Bergamo, University of Naples "Federico II". The whole budget of these projects is about € 12 millions while the grant for the University of Brescia has an estimated value of € 600,000.

In another specific program, " PROGRAMMA DI INTERVENTO IN ATTUAZIONE DELL'"ACCORDO PER LO SVILUPPO DEL CAPITALE UMANO NEL SISTEMA UNIVERSITARIO LOMBARDO", Emilio Sardini has been in charge for the implementation of the research program "Technologies for Health ".The project won a financial contribution of € 332,800.00. The intervention is aimed at the advancement of knowledge in the field of technology for health and the promotion of technology transfer to the industry.

The activity of management for the proposal and the development of research projects is also reflected in the activity carried by Emilio Sardini as Coordinator of the PhD "Technology for Health", in which he promoted the development of international links concretized even with an agreement for joint supervision with the University Pierre et Marie Curie in Paris.

In the general framework of innovating projects, not specifically of research, Emilio Sardini has played a role of responsibility, assigned by the Faculty of Engineering of the University of Brescia, in the drafting and management of two projects financed by Fondazione Cariplo. These two projects have applied to the call "Promoting the formation of human capital of excellence" in the two editions of 2010 and 2011, and after a review process the Fondazione Cariplo granted the following two projects:

a) "UNIBS International Graduate Program 2011-2012" that won a grant of € 173,750;

b) "Towards International Education and Excellence" that won a grant of 155,000 €.

Selected International Journals

[1.] D. Marioli, C. Narduzzi, C. Offelli, D. Petri, E. Sardini, A. Taroni, "*Digital time of flight measurement for ultrasonic sensors*", IEEE Trans. on Instrum. and Meas., Vol. 41, 1992, p.93-7

[2.] D. Marioli, E. Sardini, A. Taroni,"*High accuracy measurements techniques for capacitances transducers*", Meas. Sci. Technol., vol.4, 1993, pp. 337-43.

[3.] D. Marioli, E. Sardini, A. Taroni , *"A 15 ppm resolution measurement system for capacitance transducers"* , Meas. Sci. Technol., July 1996, pp. 1787-1792.

[4.] D. Marioli, E. Sardini, M. Serpelloni, A. Taroni , *"A new measurement method for capacitance transducers in a distance compensated telemetric sensor system. "*, Meas. Sci. Technol., vol.16, 2005, pp. 1593-99

[5.] C. De Angelis, V. Ferrari, D. Marioli, E. Sardini, M. Serpelloni, A. Taroni , *"Magnetically induced oscillations on a conductive cantilever for resonant microsensors"*, Sensors and Actuators A, physical, vol. 135, March 2007, pp. 197-202

[6.] Marioli D.; Sardini E.; Serpelloni M.; Taroni A.;. *"Contactless Transmission of Measurement Information Between Sensor And Conditioning Electronics*", IEEE Trans. On. Instrum. And Meas Volume 57, Issue 2, Feb. 2008 Page(s):303-8

[7.] D. Marioli, E. Sardini, M. Serpelloni, "An *inductive telemetric measurement system for humidity sensing*", Measurement Science and Technology (MST) 19 (2008), doi:10.1088/0957.

[8.] M. Baù, V. Ferrari, D. Marioli, E. Sardini, M. Serpelloni, A. Taroni, "*Contactless Electromagnetic Excitation of Resonant Sensors Made of Conductive Miniaturized Structures*", Sensors and Actuators A 148 (2008), pp.44–50.

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[11.] ANDO' B., BAGLIO S., BAU' M., FERRARI V., SARDINI E., SAVALLI N., SERPELLONI M., TRIGONA C. (2010). Numerical and experimental investigation on contactless resonant sensors. SENSORS AND ACTUATORS. A, PHYSICAL (ISSN:0924-4247) p. 329 - 335 Vol. 162 (2),

[12.] MARIOLI D., SARDINI E., SERPELLONI M. (2010). Inductive telemetric measurement systems for remote sensing. In: Milind Kr Sharma, Advances in Measurement Systems. INTECH, p. 342 - 364

[13.] Véronique Perdereau, Giovanni Legnani, Vivianne Pasqui, Emilio Sardini, Antonio Visioli (2011). International Master Program on Mechatronic Systems for Rehabilitation. JOURNAL SUR L'ENSEIGNEMENT DES SCIENCES ET TECHNOLOGIES DE L'INFORMATION ET DES SYSTÈMES. (ISSN:1638-5705) Vol. 10 HORS SÉRIE 1,

[14.] SARDINI E., SERPELLONI M. (2011). An efficient electromagnetic power harvesting device for low-frequency applications. SENSORS AND ACTUATORS. A, PHYSICAL (ISSN:0924-4247) p. 475 - 482 Vol. 172(2),

[15.] Crescini Damiano, Sardini Emilio ,Serpelloni Mauro (2011). Design and test of an autonomous sensor for force measurements in human knee implants. SENSORS AND ACTUATORS. A, PHYSICAL (ISSN:0924-4247) p. 1 - 8 Vol. 166(1),

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[17.] SARDINI E., SERPELLONI M. (2012). Wireless measurement electronics for passive temperature

sensor. IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT (ISSN:0018-9456) p. 2354 - 2361 Vol. 61(9),

[18.] CADEI A., DIONISI A., SARDINI E., SERPELLONI M. (2013). Kinetic and thermal energy harvesters for implantable medical devices and biomedical autonomous sensors. MEASUREMENT SCIENCE & TECHNOLOGY (ISSN:0957-0233) p. 1 - 14 Vol. 25

[19.] BORGHETTI M., SARDINI E., SERPELLONI M. (2013). Sensorized glove for measuring the flexion of the fingers of the hand for rehabilitation purposes. IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT (ISSN:0018-9456) p. 3308 - 3314 Vol. 62

[20.] LUCIANO V, SARDINI E, SERPELLONI M, BARONIO G (2014). An energy harvesting converter to power sensorized total human knee prosthesis. MEASUREMENT SCIENCE & TECHNOLOGY (ISSN:0957-0233) p. 1 - 10 Vol. 25.

[21.] E. Sardini, M. Serpelloni, V. Pasqui (2015). Wireless Wearable T-Shirt for Posture Monitoring During Rehabilitation Exercises. IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, vol. 64, p. 439-448, ISSN: 0018-9456, doi: 10.1109/TIM.2014.2343411

[22.] E. Sardini, M. Serpelloni, M. Lancini, (2015). Wireless Instrumented Crutches for Force and Movement Measurements for Gait Monitoring. IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, vol. 64, p. 3369-3379, ISSN: 0018-9456, doi: 10.1109/TIM.2015.246575

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[24.] Borghetti Michela, Ghittorelli Matteo, Sardini Emilio, Serpelloni Mauro, Torricelli Fabrizio (2016). Electrical Characterization of PEDOT:PSS Strips Deposited by Inkjet Printing on Plastic Foil for Sensor Manufacturing. IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, vol. 65, p. 2137-2144, ISSN: 0018-9456, doi: 10.1109/TIM.2016.2571518

Selected International Conference.

[25.] D. Marioli, E. Sardini, M. Serpelloni, A. Taroni, *"Contactless transmission of Measurement Information Between Sensor Conditioning Electronics"*, Proc. IEEE IMTC 2005 Ottawa, 17-19 May 2005, pp. 394-399.

[26.] V. Ferrari, D. Marioli, E. Sardini, M. Serpelloni, A. Taroni, *"Magnetically induced vibrations on a conductive cantilever for resonant microsensors"*, Eurosensors XIX, Barcellona, 11-14 September 2005.

[27.] D. Marioli, E. Sardini, M. Serpelloni, A. Taroni, *"A Distance Compensated Telemetric Humidity Sensor Based on the Parasitic Capacitance Variation"*, Proc. IEEE IMTC 2006 Sorrento Italy, 24-27 April 2006, pp. 655-660.

[28.] Damiano Crescini, Daniele Marioli, Andrea Taroni, Emilio Sardini, Marco Romani*," New Test Structure For Investigation Of The Piezoresistive Effect In High Temperature"*, XVIII IMEKO World Congress, , Rio de Janeiro, Brazil, September, 17 – 22, 2006

[29.] Bau M.; Ferrari V.; Marioli D.; Sardini E.; Serpelloni M.; Taroni A.;, *"Contactless Electromagnetic Excitation of Conductive Microstructures for Resonant Sensors"*, Proc. IEEE IMTC 2007 Warsaw, Poland, 1-3 May 2007, pp. 1-6.

[30.] Bau M.; Ferrari V.; Marioli D.; Sardini E.; Serpelloni M.; Taroni A.;, *"Contactless Excitation and Readout of Passive Sensing Elements Made by Miniaturized Mechanical Resonators"*, Proc. IEEE SENSORS 2007 Atlanta, 28-31 Oct. 2007 Page(s):36 - 39.

[31.] M. Baù, V. Ferrari, D. Marioli, E. Sardini, M. Serpelloni, A. Taroni, "*Passive Sensors based on contactless excitation and readout of miniaturized mechanical resonators*", Proceedings of the 13th National Conference on Sensors and Microsystems Roma, February 19-21, 2008, pp.96-97

[32.] S. Dalola, V. Ferrari, M. Guizzetti, D. Marioli, E. Sardini, M. Serpelloni, A. Taroni, *"Autonomous Sensor System with RF Link and Thermoelectric Generator for Power Harvesting*", Proc. IEEE IMTC 2008, Vancouver Island, Canada, May 12–15, 2008

[33.] M. Baù, V. Ferrari, D. Marioli, E. Sardini, M. Serpelloni, B. Andò, S. Baglio, N. Savalli, C. Trigona, "*Development of a contactless resonant MEMS force sensor in SOI Technology*", Proceedings of Eurosensors XXII 2008, Dresden, 421-4, ISBN/ISSN 978-3-00-025217-4

[34.] Marioli, D.; Sardini, E.; Serpelloni, M.; Ando, B.; Baglio, S.; Savalli, N.; Trigona, C., "*Hybrid telemetric MEMS for high temperature measurements into harsh industrial environments",* Proc. IEEE IMTC 2009, Singapore, May 5-7 2009, Page(s): 1423-1428; DOI 10.1109/IMTC.2009.5168678

[35.] B. Andò, S. Baglio, M. Baù, V. Ferrari, E. Sardini, N. Savalli, M. Serpelloni, C. Trigona, "*Contactless Electromagnetic Interrogation of a Mems-Based Microresonator Used As Passive Sensing Element*" 15th International Conference on Solid-State Sensors, Actuators and Microsystems, June 21 - 25, 2009, pages 1429-32;

[36.] Damiano Crescini, Emilio Sardini, Mauro Serpelloni "*An Autonomous Sensor for Force Measurements in Human Knee Implants*", Eurosensors XXIII, September 6-9, 2009, Lausanne, Switzerland

[37.] D. Marioli, E. Sardini, M. Serpelloni "*Electromagnetic Generators Employing Planar Inductors for Autonomous Sensors*", Eurosensors XXIII, September 6-9, 2009, Lausanne, Switzerland

[38.] B. Andò, S. Baglio, M. Baù, V. Ferrari, E. Sardini, N. Savalli, M. Serpelloni, C. Trigona "*Numerical and Experimental Investigation on Contactless Resonant Sensors*", Eurosensors XXIII, September 6-9, 2009, Lausanne, Switzerland

[39.] FLAMMINI A., MARIOLI D., SARDINI E., SERPELLONI M. (2010). **An autonomous sensor with energy harvesting capability for airflow speed measurements.** 2010 IEEE Instrumentation and Measurement Technology Conference (I2MTC) IEEE, 892- 897, vol.UNICO, In:I2MTC 2010, IEEE International Instrumentation and Measurement Technology Conference. May 3-6, 2010, Austin, TX, USA,

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[42.] SARDINI E., SERPELLONI M. (2011). **High-temperature measurement system with wireless electronics for harsh environments.** SAS 2011, IEEE Sensors Applications Symposium, Proceedings IEEE, 256- 261, vol.UNICO, In:SAS 2011, IEEE Sensors Applications Symposium. February 22-24, San Antonio, Texas,

[43.] SARDINI E., SERPELLONI M., LUCIANO V., BARONIO G. (2011). **Analysis of electrical generator for power harvesting from human movements.** BIODEVICES 2011, Proceedings of the International Conference on Biomedical Electronics and Devices SciTePress, 194- 198, vol.UNICO, In:BIODEVICES 2011, International Conference on

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[56.] SARDINI E., SERPELLONI M., FIORENTINI R. (2013). **Wireless intraoral sensor for the physiological monitoring of tongue pressure.** Solid-State Sensors, Actuators and Microsystems (TRANSDUCERS & EUROSENSORS XXVII), 2013 Transducers & Eurosensors XXVII: The 17th International Conference on 1282- 1285, vol.unico, In:Transducers 2013. 15-20 June 2013, Barcelona (Spain),,

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BOOKS

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