

CV Giancarlo FERRIGNO

February 20th, 2020



Giancarlo Ferrigno, received the Master Degree (laurea) in Electronics Engineering in 1983 and the PhD in Bioengineering in 1990, both from the Politecnico di Milano, Italy.

After spending six years with the Pro Juventute Foundation in Milano, working as a senior researcher (permanent position from 1984 to 1990), he started the academic career as Researcher at the Politecnico di Milano, where he became Associate Professor in 1998 and Full Professor of Electronic and Information Bioengineering in 2001

Research

- He pursued his research track in the field of application of analogue and digital technologies and artificial intelligence to human movement analysis, rehabilitation engineering, surgery and radiotherapy assisted by computer, and robots for surgery, patient assistance and rehabilitation.
- Achievements are documented by more than 260 publications (Scopus) 177 of which are journal articles. Scopus H-Index is 31, Scholar is 41.

Academic roles

- He actively participated in the reshaping of the degree courses of the Politecnico di Milano in 2000, as vice-president of the new programs of the bachelor and master degree in Biomedical Engineering. He also started, the Bioengineering PhD program redesigning the courses to match the new regulations of the Ministry of Education, University and Scientific Research.
- From 2003 to 2005 he was coordinator of the PhD program in Bioengineering at the Politecnico di Milano and member of the board of the Doctoral School.
- From 2005 to 2006 he was director of the Doctoral School in the same university
- In the same time frame, he was deputy director of the 'Interpolitecnica' Doctoral School in collaboration with the 'Politecnici' of Turin and Bari. In this context he managed the project for the internationalization of the research doctoral program of the Politecnico di Milano and for

the promotion of the entrepreneurship. Project "199740, DRIN: Doctorates of Research, Industry and New Business" (2004-2005), financed by the Lombardy Region.

- From 2007 to 2009 he was director of the Department of Bioengineering at the Politecnico di Milano. During this period, he organized the first peer review of the department, which was rated 'excellent'.
- During the same period, he was a member of the scientific commission of the board of department directors that was responsible for evaluating the scientific publications of the entire university.
- From 2016 to 2019 he was, at the Politecnico di Milano, coordinator of the Bioengineering section of the Department of Electronics, Information and Bioengineering (DEIB) and member of the scientific commission of the DEIB.
- Member of the faculty of the PhD in electronics and information engineering at the Politecnico di Milano, from 01-01-2013 to today
- He directed the second-level master in 'technologies for surgery' at the Politecnico di Milano in 2006
- He founded the Neuroengineering and Medical Robotics laboratory (NearLab, of which he is responsible for the activities), in 2008.
- He was among the promoters of the initiative for the creation of a network between the robotics laboratories of the Politecnico di Milano "robotics @ polimi" (robotics.polimi.it), which culminated in the foundation of the Leonardo Robotics Labs (2020)

Educational duties

- At the Politecnico di Milano he has held, in the various levels of degree in biomedical engineering and the doctorate in bioengineering, since 1994, the following courses: anthropomorphic robotics, natural and artificial intelligent systems, biosensors and micro technologies, biomedical instrumentation, electronic technologies for biomedical engineering, laboratory of medical robotics and technologies in surgery, technologies for motor behaviour analysis.
- At the University of Bergamo he taught the 'Biomedical Signals' course (from 2007 to 2010) in the three-year degree (bachelor) in computer science.
- He lectured the "Movement Analysis Foundation" course at the University of Campinas (Brazil) for master and doctoral students in biomechanics from 24 to 28 February 2003
- He held the "Movement Analysis Foundation" course at the Université de Bourgogne, Dijon, for doctoral students in Life Sciences from 24 to 28 May 2004

Schools and meetings

- Lecturer in the 'New acquisitions in assisted neurosurgery' school organized by the Bambin Gesù children's hospital in Rome in 2018
- Lecturer in the 'Robotic Neurosurgery' course organized by the Bambin Gesù children's hospital in Rome in 2017
- Member of round table 'will robots be tomorrow's surgeons?' Held in the tenth anniversary of robotic surgery in IEO, Milan.
- Invited to the Robot Expert Panel (REP) workshop of the REELER (www.reeler.eu) project, 2018.

Responsibility for projects funded on a competitive basis

During his career he has obtained funding for research from companies, EU and the Italian Space Agency. In the seventh framework program he was EU coordinator of three European projects and CO-PI of two others.

Recent Projects

- Project manager ASI BICE - biomechanical quantification of bone and muscle loading to improve the quality of 0g countermeasure prescriptions for resistive exercise, ASI 2013-065-R.0-BICE program (2013-2018)
- Responsible for WP 17001 of the ASI DC-VUM-2017-006 project "Biological and functional markers for precision astronautics biomedicine - MARS-PRE"
- EU coordinator of the strep project FP7 ROBOCAST (ROBOt and sensors integration for Computer Assisted Surgery and Therapy) FP7-ICT-2007-1-215190 (2008-10)
- EU coordinator of the strep project FP7 MUNDUS FP7-ICT-2009-4-248326 (2010 - 13)
- EU coordinator of the IP project FP7 ACTIVE FP7-ICT-2009-6-270460 (2011-15)
- CO-PI of the strep project FP7 REALNET FP7-ICT-2009-6-270434 (2011-14)
- CO-PI of the FP7 Coordination Action EUROSURGE (2011-13)
- In Horizon 2020 he is responsible for the Politecnico di Milano unit of the projects:
 - SMARTsurg (grant 732515 - 2017-2020) on robotic minimally invasive surgery
 - DIH HERO program for digitization in healthcare (grant 825003 - 2019-2022).

Older projects

- PI of the TELETHON 1992 project: 3D analysis of the mechanics of breathing in DMD patients during positive pressure intermittent ventilation with nasal masks. 1992-93
- PI of the Politecnico di Milano in the ESA EUROMIR 95 T-4 project for the Human Posture Experimental Facility. 1994-1998, funded by Alenia Spazio
- PI of the Politecnico di Milano for support in the ESA EUROMIR 95 38-D project on the vestibulo-ocular reflex. 1994-1995, funded by Alenia Spazio
- PI of the Politecnico di Milano for the European EU FP4 project "ANNIE" (application of Artificial Neural Networks in Integrated Ergonomics). 1997-1999, funded by Alenia Spazio
- PI of the Politecnico di Milano for the ASI project "Study and definition of technical scientific requirements for an advanced model of the Elite-s Facility" 1998-1999
- PI of the Politecnico di Milano of the ASI "Elite-S2" 1999-2003 project
- PI of the Politecnico di Milano of the ASI project "Disorders of the cardiorespiratory and neuromotor systems" 2004-2007
- PI of the Polytechnic of Milan in the Friuli Region project "Computer Assisted Orthopedic Surgery" 2005-2006
- PI of the Politecnico di Milano of the project financed by the Lombardy Region "Technological development of an optoelectronic biosensor for the analysis of biosynthetic and electrophysiological activity of 'in vitro' cultured neuronal networks" 2005-2006
- PI of the Politecnico di Milano of phase 'E' of the ELITE-S2 project with Kayser Italia S.r.l. 2006-2010
- CO-PI of the Politecnico di Milano of the project funded by the Italian Institute of Technologies on Bio-nanotechnologies 2006-2011
- PI of Politecnico di Milano in the PRIN 2006 National research project "Development of optical devices coupled with MicroElectrode Arrays to study information processing in neural networks cultured in vitro on microstructured substrates" 2006-2008
- Project manager of the Lombardy Region project "Researchers' funding: New ICT and robotics contributions to diagnostics, therapy and rehabilitation. Therapy and diagnosis through ICT and Robotics THEROBOT" (2010-2013)

Editorial activities

- Associate editor of Computer Methods and Modelling in Medicine,
- Associated editor of Neural Technology (section of Frontiers in Neuroscience)

- Editorial board member of Sensors (biomedical sensors section)
- Since 2013 he is a member of the scientific committee of the CRAS (Computer and Robotic Assisted Surgery) annual conference
- Since 2017 he is a member of the scientific committee of the Hamlyn Symposium.

Organization, presence in scientific committees of conferences / workshops

- Has been organizer and chair of the 'VI Convegno del Gruppo Nazionale di Bioingegneria' in 2018
- Scientific committee of Computer Assisted Orthopaedic Surgery – CAOS Italia, Milano, 2008;
- Organization of the Workshop on Surgical Robotics at EU-ROBOTICS FORUM, held in Vasteras, Sweden, 2011;
- First International Workshop on Cognitive Robotics in Surgery, held in Heidelberg, Germany, 26-28 January 2012;
- Organization of the EUROSURGE workshop: Roadmap towards European Network of Surgical Robotics laboratories, held in Odense, Denmark, 7 March 2012
- Organization of the 'Modular Surgical Robotics workshop: how can we make it possible?' May 14-18, ICRA 2012, S. Paul, Minnesota.
- Organization (local) of the 'international seminar on surgical robotics', Milan, 3 July 2012.
- Organization of the ICNR 2012 Satellite Workshop: Challenges for assistive neuro-robotic devices: the experience of the MUNDUS project. Toledo, November 13, 2012.

Invited lectures

- ICRA 2010, Workshop on "Advanced surgical service robotics in the European Union 6th and 7th Framework Programs", (Anchorage, Alaska)
- ICRA 2010, Workshop on "Rehabilitation and Assistive Robots for an Aging Society", (Anchorage, Alaska);
- Seminar "New Technologies for Rehabilitation Medicine" 17-19 October 2010 (Technion - Haifa, Israel);

- Workshop: "Italy and Israel: excellence through partnerships. Prostheses, New materials, Robotics and Computer Aided Surgery", May 23, 2011 (Tel Aviv, Israel);
- Workshop: "Joint Workshop on New Technologies for Computer / Robot Assisted Surgery" 2011 (Graz, Austria);
- Key note lecture: Zurich Rehabilitation Week 2011 (Zurich, Switzerland).
- "Robotic neurosurgery", Summer School at the Politecnico di Milano, May 2011

Evaluation and review activity

- From 2007 to 2009, as director of the Department of Bioengineering at the Politecnico di Milano, he organized the first peer review of the department, which was rated as excellent.
- During the same period, he was a member of the scientific commission of the board of directors of the department, and was involved in the evaluation of scientific publications throughout the university.
- He has been evaluator of FET proposals in FP7, and reviewer of FET projects, since 2007, and remote reviewer of ERC-2018-STG proposals
- In 2019 he has been an evaluator of research proposals from the French-Italian University.
- He was on the lists for the role of National Scientific Habilitation Commissioner of the session, 2018-2020
- Since 2009 he has been included in the list of experts of the Ministry for Economic Development and from 2011 to 2018 he was technical auditor of two industrial projects financed by the same Ministry.

Society and other bodies

- Senior Member (since 2015) of the IEEE scientific society (RAS and EMBS)
- Expert member in the joint working groups ISO / IEC TC 299 (robotics) - JWG 35 (standard for medical robotics for surgery) and JWG 36 (standard for medical robotics for rehabilitation) which have given rise, respectively, to the particular standards IEC 80601 -2-77: 2019 and IEC 80601-2-78: 2019

Patents

- U.S. Pat. N. 4,706,296 issued on 10-11-1987 on filing of 30-5-1984:
- Modularly expansible system for real-time processing of a TV display, useful in particular for the acquisition of coordinates of known shapes objects.
- U.S. Pat. No. 4,989,259 issued on 29-1-1991 on filing of 22-1-1990:

- Optical correlator for incoherent light images.
- Italian patent No. 01256174 issued on 11/29/1995 on filing of 4-11-1992: Optoelectronic device for the recognition of a subject's respiratory kinematics.
- European patent 0153439 of 4-8-1993: Modularly expansible system for real time processing of a TV display, useful in particular for the acquisition of coordinates of known shape objects and method using said system in radiography.

Awards

- Thesis prize: ELSAG 1984 'prize for the best computer vision work' (ex aequo with Vincent Torre (Media Labs))
- Prize for the thesis from HUSPI (Honeywell and University of Pavia). 1987 award for the best work in: "Integrated Sensory Systems in Robotics and Prosthetics".
- Best paper presentation award (with co-authors) at CRAS 2018 (London): Advanced User Interface for Augmented Information Display on Endoscopic Surgical Images

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