Edoardo Sinibaldi - CV

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Pisa (Italy), September 14, 2023

(Edoardo Sinibaldi) Elal Sill.

Main Personal Data and Contacts

Family name:	Sinibaldi
First name:	Edoardo
Gender:	Male
Nationality:	Italian
Place of birth:	Terni (Italy)
Date of birth:	1976/12/16
Fiscal Code:	SNBDRD76T16L117R
Civil status:	Married with Roberta (since 2002),
	father of Angelica (born 2005)
	and Pier Giorgio (born 2008)
Personal contacts:	Permanent address: Via di Oratoio 55, (ZIP: 56121), Pisa, Italy
	E-mail: edoardosinibaldi@gmail.com; Tel.:(+39) 329 4441136 (mobile)
Institutional contacts:	Edoardo Sinibaldi, PhD
	Istituto Italiano di Tecnologia (iit)
	Center for Convergent Technologies; via Morego 30, (ZIP: 16163), Genova, Italy
	E-mail: edoardo.sinibaldi@iit.it; Web: www.iit.it/people/edoardo-sinibaldi

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Main Positions/Qualifications and Education

- [2017/04 present] <u>National Scientific Qualification</u> as <u>Associate Professor of Bioengineering</u> (ASN 2016, SC 09/G2). <u>National Scientific Qualification</u> as <u>Associate Professor of Applied Mechanics</u> (ASN 2016, SC 09/A2)
- [2009/11 present] <u>Researcher</u> at <u>Istituto Italiano di Tecnologia</u> (www.iit.it; at Center for Convergent Technologies, Genova, Italy; formerly at Center for Micro-Biorobotics, Pontedera, Italy). (Fixed-term contracts as senior post-doc/researcher until 2018, then permanent contract as chief technician in the Bioinspired Soft Robotics research line.) <u>Research Scopes</u>: Modeling and Robotic Systems/Devices for Biomedical Applications; Model-Based Design of Flexible Tools; Soft Robotics
- [2006/01 2009/10] Post-doctoral Research Fellow at Scuola Superiore Sant'Anna (www.santannapisa.it; at The Biorobotics Institute, Pontedera, Italy). (Fixed-term contract.) <u>Research/Working Scopes</u>: Bioinspired robotics; Competitive fundraising and project technical management
- [2002/07] National Qualification as Engineer (Industrial Engineering)
- [2001/06 2001/12] <u>Intern Research Fellow</u> at <u>Rolls-Royce plc</u> (www.rolls-royce.com; at Aerothermal Methods Dept., Derby, UK). (Fixed-term contract.) <u>Research scope</u>: Computational geometry
- [2003 2005] <u>PhD in Mathematics for Technology and Industry</u> at <u>Scuola Normale Superiore</u> (www.sns.it; Pisa, Italy). Mark: <u>summa cum laude</u> (70 e lode /70). <u>Research scope</u>: Computational fluid dynamics.

Note: I won <u>two distinct PhD positions</u>, namely the above one in Applied Mathematics at Scuola Normale Superiore, and another one in Aerospace Engineering at University of Pisa. I renounced the latter position in favor of the former. <u>I ranked first in each admission exam</u>

- [1995 2002] <u>BSc/Msc Degree</u> in <u>Aerospace Engineering</u> at <u>University of Pisa</u> (www.unipi.it; Pisa, Italy). Mark: <u>summa cum laude</u> (110 e lode /110)
- [1995/07] High-School Diploma at Scientific Lyceum ("R. Donatelli" Lyceum; Terni, Italy). Mark: 60/60
- [1987 1995] <u>Piano degree</u>: <u>admission to Grade-8</u> (Grade-10 license awarding the final Conservatory Diploma) at <u>Institute of Higher Training in Art, Music and Dance</u> ("G. Briccialdi" AFAM Institute; Terni, Italy). Participation to national and international piano master classes. <u>Certificate Marks</u>: <u>8/10</u> (general music knowledge); <u>10/10</u> (grade-5 piano license); <u>10/10</u> (history of music); <u>10/10</u> (harmony certificate).

Note: I was the <u>first</u> student to get full marks in both harmony and history of music certificates, since the Institute establishment in 1974. <u>Second Prize</u> at the 1994 "Riviera della Versilia" piano contest (Camaiore, Italy)

Institutional Biosketch (copy from: www.iit.it/people/edoardo-sinibaldi)

Edoardo Sinibaldi is a researcher keen on science and humanities. After diverting from a passionate pre-professional path in classical music (piano), in 2002 Edoardo received a BSc/MSc in Aerospace Engineering (with Honors) from the University of Pisa (Pisa, Italy), once completed an internship at Rolls-Royce plc (Derby, UK) for which he had been individually selected, and during which he studied computational geometry methods for air-breathing engines. In 2006, Edoardo obtained a Ph.D. in Mathematics for Technology and Industry (with Honors) from Scuola Normale Superiore (Pisa), where he developed numerical schemes for computational fluid dynamics, with application to high-performance computing of cavitating flows in liquid-propellant rocket engines. Then he moved to Scuola Superiore Sant'Anna (Pisa; The BioRobotics Institute), where his post-doctoral fellowship was capitalized for competitive fundraising and project technical management, with funding obtained for both national and European projects. At the end of 2009, upon passing to the Italian Institute of Technology (iit; Genoa, Italy), he deliberately switched back to research. Edoardo Sinibaldi is a scientifically solid and creative researcher (framed by iit with fixed-term contracts as senior post-doc/researcher until 2018, then with a permanent contract as chief technician in the Bioinspired Soft Robotics research line), and his scientific activity strategically bridges modeling (at large, and in particular for biomedical applications), model-based design (in particular for flexible/biomedical tools) and (bioinspired) soft robotics, with growing interest in magnetics and physical intelligence. Since 2017, Edoardo also holds two national scientific qualifications as Associate Professor (namely for Applied Mechanics, and for Bioengineering), also stemming from his continuous dedication to complementary academic teaching and mentoring of students and young researchers/innovators (in Italy and abroad).

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Edoardo Sinibaldi authored 60 papers on international journals (all of them being research papers, with the only exception of just 1 review) and nearly 20 papers on international conferences, 7 patents, 1 book and 3 book chapters (plus 1 popular science book, as editor and co-author). He serves as reviewer for 70 international journals, besides international conferences and research proposals (European Research Council, Swiss National Science Foundation, Dutch Research Council, Hong Kong Research Grants Council), and as editorial board member (associate/academic editor) for international journals, such as Scientific Reports (Nature Research), Frontiers in Bioengineering and Biotechnology and PLOS ONE.

Edoardo strongly values integrity, respect, ethics, trust, fairness and solidarity, and grounds on them his relationships, also in professional pathways.

For any additional details/contacts, you can reach Edoardo by email at edoardo.sinibaldi[AT]iit.it. Yet, please, feel free to also reach him "in person", because he is keen on fostering "physical" (before than/besides "virtual") interactions for building and developing human and professional relationships.

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Scientific Activity

Scientific Activity Overview

Taking advantage of my <u>multidisciplinary</u> background, I pursue <u>both theoretical modeling and engineering</u> <u>studies</u>, often bridged through <u>model-based creative design</u>. My main research scopes are <u>biomedical</u> <u>engineering/robotics</u> and <u>soft robotics</u>, with growing interest in <u>physical intelligence</u>.

• [2009/11 – present] at Istituto Italiano di Tecnologia (Genova [and, formerly, Pontedera], Italy)

Modeling and Robotic Systems/Devices for Biomedical Applications

In collaboration with <u>medical doctors</u>, we integrated <u>force-feedback restoration</u> in the research-oriented version of the <u>da Vinci robotic system</u> (dVRK) and we developed a robotic <u>platform for neuroendoscopy</u> based on a lightweight compliant manipulator (with potential for enhanced surgeon-robot interaction). We contributed to the development of robotic platforms for ultrasound-based procedures (namely, medical microrobot tracking, robotic scanning, and robotic needle placement), resection, intracorporeal palpation, and removal of vascular obstructions (with focus on magnetic dragging of endovascular devices and obstruction debris). We supported the development of model-based magnetic localization systems for robotic prostheses. Moreover, we developed a <u>bendable manipulator</u> for minimally-invasive implant delivery and <u>robotic capsules</u> for operation in the gastrointestinal tract, with focus on magnetically-actuated navigation, and on the release of bioadhesive patches for therapy/medication. We are also addressing mechatronic devices for colonoscopy (details TBA).

We developed analytical models for pulsatile biological flows such as blood and cerebrospinal fluid flow, with application to the controlled navigation of magnetoresponsive carriers in the bloodstream, and to intrathecal drug delivery (ITDD, namely drug release within the cerebrospinal fluid, to overcome the shielding effects of the blood-brain-barrier to drugs administered via traditional routes). Furthermore, we developed computational models for ITDD in realistic anatomical domains (three-dimensional patient-specific geometries), up to including drug transport to the cord. We also developed simplified models for particle transport after injection into biological tissues (poroelastic brain tissue), as functional to the preliminary design of particle-mediated intratumoral thermotherapy (including magnetic hyperthermia). Moreover, by leveraging the collaboration with experimentalists, we provided simplified models for characterizing the remote manipulation of magnetoresponsive polymeric films, nanoparticles (for drug targeting), and nanoscribed scaffolds (for cell coculture, patented), as well as polymeric films and aqueous dispersions with nanoparticles capable of photothermal conversion (for tissue thermal ablation). We also developed simplified models for characterizing piezonanoparticle-mediated wireless cell stimulation, and we contributed, through computational modeling, to the characterization of bioreactors for biomimetic cell stimulation (combining perfusion and piezo-nanoparticlemediated stimulation). In addition, by means of model-based design, we contributed to demonstrate the first toscale three-dimensional, hybrid physical model of the blood-brain-barrier (paper with inside front cover in Small): such devices, which allow to study barrier crossing by therapeutic agents, foster the development of in vitro methods that could effectively mitigate related ethical issues.

Considering the growing importance of magnetic methods/systems for biomedical research at large, I addressed the determination of related, <u>long-sought fundamental analytical solutions</u>. I thus achieved <u>the exact, explicit, computationally robust and complete analytical solution for cylindrical magnets with generic magnetization (almost single-author paper in Advanced Science), which enables the design of magnet systems/devices with <u>programmable magnetization</u> and supports the development of magnetic soft materials and robots.</u>

Model-Based Design of Flexible Tools (in particular for biomedical applications)

We combined <u>mechanical and material intelligence</u> for introducing <u>surgical graspers</u> (suitable for both manual and robotics surgery) with enhanced capabilities. Specifically, in collaboration <u>with medical doctors</u>, we first introduced passive compliant graspers, based on soft-material <u>transversally-morphing jaws</u> (patented), which enable safe-and-effective interaction with tissue. Based on such a design, we then introduced mechanochromic jaws paving the way for <u>electronics-free visual force-feedback during grasping</u> (patented).

Still in collaboration with medical doctors, we introduced a <u>magnetic catheter</u> able to efficiently retrieve magnetoresponsive carriers from the bloodstream (paper with <u>frontispiece in Advanced Science</u>). <u>Magnetic</u> <u>retrieval</u> offers a game-change compared to mainstream magnetic targeting, because it could effectively mitigate side effects due to uncontrolled carriers' biodistribution (which is a critical issue hampering magnetic targeting).

Moreover, drawing <u>inspiration from counterpoint classical music</u>, I introduced a model-based design approach for a <u>novel class of continuum devices</u>, namely interlaced continuum robots, up to demonstrating the first instance of such tools by developing a <u>flexible probe</u> (<u>patented</u>) able to physically build a sought trajectory through the incremental deployment of its shaft, without external supports. The resulting <u>"follow-the-leader</u>" deployment (which is strongly sought, e.g., for inspection and endoscopic procedures), clearly illustrates the embodiment of <u>physical intelligence</u> through the creative design process.

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Soft Robotics

We addressed <u>plant-inspired technologies</u>. Specifically, after studying a mechatronic system inspired by plant roots (<u>Best Paper award in IEEE TMECH</u>), we addressed <u>osmotic actuation</u>: thanks to an ice-breaking <u>analytical model</u>, we developed a bioinspired <u>osmotic actuator</u> that allowed to further investigate natural plant osmolytes (thus "<u>closing the loop</u>" between natural and artificial systems), and we demonstrated osmosis-based reversible actuation by exploiting the electrosorption of ions on flexible electrodes (paper in <u>Nature Communications, with highlight in Nature</u>). Moreover, we carried out (analytical/computational) <u>modeling</u> activities to characterize miniature artificial systems for <u>on-leaf anchoring</u>, to design/characterize <u>bilayer actuators</u> based on <u>conductive</u> and <u>hygroscopic</u> polymers (the latter also leading to plant-inspired bistable structures), and to support the development of related manufacturing by means of electrospinning. We are also developing analytical models for selected hygro-responsive plant structures (details TBA).

Considering animal models, we studied octopus-inspired adhesion systems (suckers), and we are investigating multiphysical aspects in selected small-scale animals (details TBA). Furthermore, taking inspiration from specific mechanoreceptors in the human skin, we addressed the design of soft-material tactile sensors based on optical sensing elements embedded in polymeric matrices (<u>patented</u>). Specifically, we combined model-based and model-less approaches (thus <u>integrating physical and computational artificial intelligence</u>) in order to simultaneously achieve contact localization and force intensity detection, also implemented in large-area patches for artificial skins (paper with <u>front cover in Nature Machine Intelligence</u>).

[2006 – 2009/10] at Scuola Superiore Sant'Anna (The Biorobotics Institute, Pontedera, Italy)

Bioinspired Robotics

Development of numerical <u>models</u> for <u>design and control of animal-inspired artefacts</u> (with some focus on locomotion biomechanics): an autonomous swimming robot inspired by lampreys; a jumping robot inspired by green leafhoppers, an insect-like miniature robot devised for robotic colonoscopy.

Competitive Fundraising and Project Technical Management

Competitive fundraising (grant proposal preparation); scientific/technical support and technical management for projects mainly related to <u>bioinspired robotics</u>, <u>biomechanics</u> and novel <u>manufacturing technologies</u>.

Note: I substantially contributed to raise <u>1.15 M€</u> by winning one national project (PRIN) and two European FP7 projects, including a large-scale integrating project for which I formally served as assistant project manager.

• [2003 – 2005] at Scuola Normale Superiore (Pisa, Italy)

Computational Fluid Dynamics

Development of <u>numerical schemes</u> for hyperbolic conservation laws, and in particular for the simulation of <u>cavitating flows</u> within the turbopumps of <u>liquid propellant rocket engines</u>. I proposed novel schemes and I implemented them within a t<u>hree-dimensional, parallel, mixed finite-element/finite-volume code dealing with</u> <u>unstructured grids</u>. The resulting numerical solver (running on <u>high-performance-computing</u> infrastructures) was successfully validated against experimental data.

Note: My PhD work was published as a <u>research monograph</u> (E. Sinibaldi, "Implicit preconditioned numerical schemes for the simulation of three-dimensional barotropic flows", Edizioni della Normale, 2007, ISBN: 978-88-7642-310-9), after a <u>scientific evaluation completely distinct from that one related to the doctoral degree fulfillment</u>.

• [2001] at Rolls-Royce plc (Derby, UK)

Computational Geometry

Development of <u>computational methods</u> for <u>approximating complex three-dimensional surfaces</u>, as obtained from fluid-dynamics-based optimization of air-breathing engines, through Non Uniform Rational Basis-Splines (NURBS) surfaces.

Note: For this research internship, I was selected, <u>by merit</u>, at University of Pisa (<u>one selected profile per year</u>, myself being the third one ever). Over the period, I directly reported to the Head of the Aerothermal Methods Dept., and I directly worked with Dr. S. Shahpar (Rolls-Royce Fellow in Aerothermal Design Systems).

Scientific Outcome Overview

My scientific activity practically <u>started in 2010</u>. At that time, I had cumulatively published <u>3 journal papers</u> (JPs: papers on refereed international journals) and <u>3 conference papers</u> (CPs: papers on refereed international conference proceedings), stemming from my PhD period (2003-2005). Indeed, during the subsequent post-doctoral period, my activity was strongly directed towards competitive fundraising and project technical management (I nonetheless used that period to familiarize with bioengineering/biorobotics, thus widening my knowledge and skills). Considering my scientific education and interest, in 2010 I deliberately switched back to research: I decided to <u>prioritize scientific publications</u>, building on my own strength, and by intentionally postponing further fundraising (and project management) activities to a later stage.

Over the years, I addressed multiple research scopes (let me underline that on several occasions I changed/had to change scope in order to positively adapt to institutional indications, seemingly resulting from the evolution of my Institute), thus generating a <u>multidisciplinary scientific production</u>, which is centered in the scope of bioengineering/biorobotics. <u>To date</u>, my production includes 60 JPs, 18 CPs and 7 patents (2 of which as leading inventor), as well as complementary (peer-reviewed) scientific contributions.

<u>Three ratios</u> give a quick snapshot of my scientific production:

<u>60 / 18 ≈ 3.33</u>	is the <u>journals/conferences</u> paper ratio;
59 / 60 ≈ 98.3%	of the JPs are <u>research papers (only 1 JP is a review paper);</u>
<u>38 / 60 ≈ 63.3%</u>	of the JPs were authored as first, leading and/or corresponding author in
	recognition of fundamental scientific contributions even in collaborative works.

To date, my Scopus profile features 2069 citations and an h-index of 26.

The following derived metrics and charts provide an additional sketch of my scientific production in terms of <u>structure, continuity and evolution, and impact</u>. (In general, beyond popular metrics, I would encourage to carefully scrutinize <u>quality and individual contributions</u> in scientific papers: I am ready and glad to discuss mine.)



(Legend: IF: impact factor; SJR: SCImago Journal Rank; SNIP: Source Normalized Impact per Paper. Data extracted from Scopus, through the iit database, on September 5, 2023.)

Awards and Recognitions

• [2022/05] Front Cover of Nature Machine Intelligence for the following research paper:

L. Massari, G. Fransvea, J. D'Abbraccio, M. Filosa, G. Terruso, A. Aliperta, G. D'Alesio, M. Zaltieri, E. Schena, E. Palermo, E. Sinibaldi^{*} and C.M. Oddo^{*}, "Functional mimicry of Ruffini receptors with Fiber Bragg Gratings and Deep Neural Networks enables a bio-inspired large-area tactile sensitive skin". Nature Machine Intelligence, 4(5), 425-435, 2022 (* corresponding) [DOI: 10.1038/s42256-022-00487-3]

• [2020/04] "<u>Top Downloaded Paper 2018-2019 Award</u>" (top 10% most downloaded IJMRCAS papers published between 2018/01 and 2019/12), for the following research paper:

A. Saracino, A. Deguet, F. Staderini, M.N. Boushaki, F. Cianchi, A. Menciassi* and E. Sinibaldi*, "Haptic feedback in the da Vinci Research Kit (dVRK): a user study based on grasping, palpation and incision tasks". International Journal of Medical Robotics and Computer Assisted Surgery, 15(4), e1999 (13 pages), 2019 (* corresponding) [DOI: 10.1002/rcs.1999]

• [2019/03] <u>Highlight</u> in the <u>2019 European Research Council (ERC) Annual Report</u> ('Annual Report on the ERC activities and achievements in 2018') for the achievements reported in the following research paper:

A. Marino^{*}, O. Tricinci^{*}, M. Battaglini, C. Filippeschi, V. Mattoli, E. Sinibaldi^{*} and G. Ciofani^{*}, "A 3D real-scale, biomimetic and biohybrid model of the blood-brain barrier fabricated through two-photon lithography". Small, 14(6), 1870024 (1 page), 2018 (* corresponding) [DOI: 10.1002/smll.201702959]

 [2019/01] <u>Research Highlight</u> in <u>Nature</u>: "A robotic vine that can coil itself around the real thing" (https://www.nature.com/articles/d41586-019-00308-5) for the achievements reported in the following research paper:

I. Must, E. Sinibaldi^{*} and B. Mazzolai^{*}, "A variable-stiffness tendril-like soft robot based on reversible osmotic actuation". Nature Communications 10(1), 344 (8 pages), 2019 (* corresponding) [DOI: 10.1038/s41467-018-08173-y]

• [2018/09] <u>Frontispiece</u> of <u>Advanced Science</u> for the following research paper:

V. lacovacci^{*}, L. Ricotti, E. Sinibaldi^{*}, G. Signore, F. Vistoli and A. Menciassi, "An intravascular magnetic catheter enables the retrieval of nanoagents from the bloodstream". Advanced Science, 5, 1800807 (8 pages), 2018 (* corresponding) [DOI: 10.1002/advs.201800807]

• [2018/02] <u>Inside Front Cover</u> of <u>Small</u> 6/2018:

A. Marino*, O. Tricinci*, M. Battaglini, C. Filippeschi, V. Mattoli, E. Sinibaldi* and G. Ciofani*, "A 3D real-scale, biomimetic and biohybrid model of the blood-brain barrier fabricated through two-photon lithography". Small, 14(6), 1870024 (1 page), 2018 (* corresponding) [for the research paper with DOI: 10.1002/smll.201702959] [DOI: 10.1002/smll.201870024]

• [2015/03] Front Cover of Advanced Materials 10/2015:

S. Taccola, F. Greco, E. Sinibaldi, A. Mondini, B. Mazzolai and V. Mattoli, "Soft Actuators: Toward a New Generation of Electrically Controllable Hygromorphic Soft Actuators (Adv. Mater. 10/2015)" Advanced Materials, 27(10), pp. 1637-1637, 2015 [for the research paper with DOI: 10.1002/adma.201404772]

[DOI: 10.1002/adma.201570065]

• [2012/05] <u>Finalist (top 5)</u> for the <u>"Best Medical Robotics Paper Award"</u> (hundreds of submissions) at the 2012 IEEE International Conference on Robotics and Automation (<u>ICRA2012</u>, St. Paul, Minnesota, USA, 14-18 May 2012) for the following research paper:

M. Khorami Llewellyn, P. Dario, A. Menciassi and E. Sinibaldi, "Magnetic Dragging of Vascular Obstructions by Means of Electrostatic and Antibody Binding", Proceedings of ICRA2012, pp. 2504-2509, 2012 [DOI: 10.1109/ICRA.2012.6224905]

• [2012/07] <u>"2012 TMECH Best Paper Award"</u> (best paper published during 2011 in the IEEE/ASME Transactions on Mechatronics journal) for the following research paper:

B. Mazzolai, A. Mondini, P. Corradi, C. Laschi, V. Mattoli, E. Sinibaldi and P. Dario, "A Miniaturized Mechatronic System Inspired by Plant Roots", IEEE Transaction on Mechatronics 16(2), pp. 201-212, 2011 [DOI: 10.1109/TMECH.2009.2038997]

• [2002/11] <u>Winner</u> (ranked first, mark: 9.5/10) of a PhD position in Mathematics for Technology and Industry at <u>Scuola Normale Superiore</u>, Pisa, Italy

CV

- [2002/11] <u>Winner (ranked first</u>, mark: 89/100) of a PhD position in Aerospace Engineering at University of Pisa, Italy. I renounced the position in favor of another PhD position simultaneously won at Scuola Normale Superiore (see point above)
- [2001] <u>Winner</u> of a "Socrates" scholarship (granted by European Community; engineering sector) for carrying out my final-year project at University of Toulouse, France. I renounced the position in favor of a research fellowship (internship) simultaneously obtained at Rolls-Royce plc, Derby, UK

Patents

- A. Giannotti, I. Strauss, <u>E. Sinibaldi</u> and S. Micera, "Self-inserting peripheral neural interface" <u>Italian patent application no. IT102022000023493</u>, filed on November 15, 2022
 Subject: a peripheral neural interface that combine easy implantation and mechanical stability typical of extraneural interfaces, with high selectivity and fascicles-resolution typical of intraneural interfaces
- G. Giordano, <u>E. Sinibaldi</u>, Y. Huan, M. Gagliardi, M. Carlotti and B. Mazzolai. "Mechanochromic pressure sensor for safe and effective tissue handling in minimally invasive surgery" <u>International patent publication no. WO2022201024</u> (PCT/IB2022/052608), published on September 29, 2022 Subject: surgical grasper featuring mechanochromic soft-material jaws able to provide visual feedback during sample clutching, as functional for effective and safe interaction with tissue
- A. Marino, D. De Pasquale, <u>E. Sinibaldi</u> and G. Ciofani. "Cell co-culture system and method" <u>US patent publication no. US2022290087 A1</u>, published on September 15 2022 <u>Japanese patent application JP2022551914 A</u>, published on December 14, 2022 <u>European patent publication no. EP4041858 A1</u>, published August 17, 2022 <u>International patent publication no. WO2021070045</u> (PCT/IB2020/059365), published on April 15, 2021 Subject: 3D cell co-culture method and system, based on magnetoresponsive scaffolds
- 4. J. D'Abbraccio, L. Massari, C.M. Oddo, E. Palermo, E. Schena, <u>E. Sinibaldi</u>, G. Terruso and M. Zaltieri. "A tactile sensor device"

<u>Italian Patent</u> 102019000003657 granted on February 19, 2021 <u>Italian patent publication no. IT102019000003657</u>, published on September 14, 2020 Subject: sensorized artificial skin for prosthetics and collaborative robotics applications

- <u>E. Sinibaldi</u>, Y. Huan, A. Menciassi and B. Mazzolai. "Adaptively morphing surgical grasper" <u>US Patent US 11529161</u> granted on December 20, 2022 <u>European Patent EP 3749228</u> granted on June 2, 2021 <u>International patent publication no. WO2019155316</u> (PCT/IB2019/050621), published on August 15, 2019 Subject: compliant surgical grasper for effective and safe interaction with tissue
- 6. <u>E. Sinibaldi</u>, B. Kang and R. Kojcev, "A shape-keeping deployable structure including a pair of robotic systems of the continuum type"

<u>US Patent US 10675755</u> granted on June 9, 2020 <u>Japanese Patent JP 6667552</u> granted on March 18, 2020 <u>European Patent EP 3288438</u> granted on February 27, 2019 <u>International patent publication no. WO2016174596</u> (PCT/IB2016/052396), published on November 3, 2016 Subject: flexible tool that can be deployed over a chosen trajectory with the whole body, without using auxiliary supports (the first interlaced continuum robot, with intrinsic "follow-the-leader" capability)

 V. Pensabene, <u>E. Sinibaldi</u>, A. Menciassi, P. Dario, C. Quaglia and P. Valdastri, "Capsule for local therapy by means of an endoluminal plaster in the gastrointestinal tract" <u>International patent publication no. WO2013027182</u> (PCT/IB2012/054239), published on February 28, 2013 Subject: robotic capsule for releasing patches in the gastro-intestinal tract

Main Scientific Publications and Talks

> [Journal Papers as First, Leading and/or Corresponding Author]

- F. Masiero and <u>E. Sinibaldi</u>*, "Exact and computationally robust solutions for cylindrical magnets systems with programmable magnetization". Advanced Science, 10(25), 2301033 (16 pages), 2023 (* corresponding)
 [DOI: 10.1002/advs.202301033; ISI-ID (WOS): 001029923700001; Scopus-ID: 2-s2.0-85164955726]
- S. Mariani^{*}, L. Cecchini, A. Mondini, E. Del Dottore, M. Ronzan, C. Filippeschi, N.M. Pugno, <u>E. Sinibaldi</u>^{*} and B. Mazzolai^{*}, "A bioinspired plasmonic nanocomposite actuator sunlight-driven by a photothermal-hygroscopic effect for sustainable soft robotics". Advanced Materials Technologies, 8(14), 2202166 (10 pages), 2023 (* corresponding)

[DOI: 10.1002/admt.202202166; ISI-ID (WOS): 000976788500001; Scopus-ID: 2-s2.0-85153602870]

L. Massari, G. Fransvea, J. D'Abbraccio, M. Filosa, G. Terruso, A. Aliperta, G. D'Alesio, M. Zaltieri, E. Schena, E. Palermo, <u>E. Sinibaldi</u>* and C.M. Oddo*, "Functional mimicry of Ruffini receptors with Fiber Bragg Gratings and Deep Neural Networks enables a bio-inspired large-area tactile sensitive skin". Nature Machine Intelligence, 4(5), pp. 425-435, 2022 (* corresponding) <u>Front cover of Nature Machine Intelligence</u>

[DOI: 10.1038/s42256-022-00487-3; ISI-ID (WOS): 000805600600002; Scopus-ID: 2-s2.0-85130872997]

4. F. Masiero*, <u>E. Sinibaldi</u>*, F. Clemente and C. Cipriani, "Effects of sensor resolution and localization rate on the performance of a Myokinetic Control Interface". IEEE Sensors Journal, 21(20), pp. 22603-22611, 2021 (* corresponding)

[DOI: 10.1109/JSEN.2021.3109870; ISI-ID (WOS): 000709128900048; Scopus-ID: 2-s2.0-85114735649]

G. Giordano*, M. Gagliardi, Y. Huan, M. Carlotti, A. Mariani, A. Menciassi, <u>E. Sinibaldi</u>* and B. Mazzolai*, "Toward mechanochromic soft material-based visual feedback for electronics-free surgical effectors". Advanced Science, 8(15), 2100418 (13 pages), 2021 (* corresponding)

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 Y. Huan, I. Tamadon, C. Scatena*, V. Cela, A.G. Naccarato, A. Menciassi* and <u>E. Sinibaldi</u>*, "Soft graspers for safe and effective tissue clutching in minimally invasive surgery". IEEE Transactions on Biomedical Engineering, 68(1), pp. 56-67, 2021 (* corresponding)

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 E. Redolfi Riva*, <u>E. Sinibaldi</u>*, A.F. Grillone, S. Del Turco, A. Mondini, T. Li, S. Takeoka and V. Mattoli*, "Enhanced in vitro magnetic cell targeting of doxorubicin-loaded magnetic liposomes for localized cancer therapy". Nanomaterials, 10(11), 2104 (18 pages), 2020 (* corresponding)

[DOI: 10.3390/nano10112104; ISI-ID (WOS): 000593812500001; Scopus-ID: 2-s2.0-85094592571]

 D. Lunni*, G. Giordano, F. Pignatelli, C. Filippeschi, S. Linari, <u>E. Sinibaldi</u>* and B. Mazzolai*, "Light-assisted electrospinning monitoring for soft polymeric nanofibers", Scientific Reports (Nature Research), 10, 16341 (12 pages), 2020 (* corresponding)

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M. Battaglini*, A. Marino, A. Carmignani, C. Tapeinos, V. Cauda, A. Ancona, N. Garino, V. Vighetto, G. La Rosa, <u>E. Sinibaldi</u>* and G. Ciofani*, "Polydopamine Nanoparticles as an Organic and Biodegradable Multitasking Tool for Neuroprotection and Remote Neuronal Stimulation". ACS Applied Materials and Interfaces, 12(32), pp. 35782-35798, 2020 (* corresponding)

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- Tamadon, Y. Huan, A.G. de Groot, A. Menciassi* and <u>E. Sinibaldi</u>*, "Positioning and stiffening of an articulated/continuum manipulator for implant delivery in minimally invasive surgery". International Journal of Medical Robotics and Computer Assisted Surgery, 16(2), e2072 (15 pages), 2020 (* corresponding)
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L. Massari*, E. Schena, C. Massaroni, P. Saccomandi, A. Menciassi, <u>E. Sinibaldi</u>*# and C.M. Oddo*#, "A machine-learning-based approach to solve both contact location and force in soft-material tactile sensors". Soft Robotics, 7(4), pp. 409-420, 2020 (* corresponding, # co-leading)

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- A. Saracino, A. Deguet, F. Staderini, M.N. Boushaki, F. Cianchi, A. Menciassi* and <u>E. Sinibaldi</u>*, "Haptic feedback in the da Vinci Research Kit (dVRK): a user study based on grasping, palpation and incision tasks". International Journal of Medical Robotics and Computer Assisted Surgery, 15(4), e1999 (13 pages), 2019 (* corresponding) [DOI: 10.1002/rcs.1999; ISI-ID (WOS): 000474634600008; Scopus-ID: 2-s2.0-85066021109]
- I. Must, <u>E. Sinibaldi</u>* and B. Mazzolai*, "A variable-stiffness tendril-like soft robot based on reversible osmotic actuation". Nature Communications 10(1), 344 (8 pages), 2019 (* corresponding).
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- A. Grillone*, M. Battaglini*, S. Moscato, L. Mattii, C. de Julián Fernández, A. Scarpellini, M. Giorgi, <u>E. Sinibaldi</u>* and G. Ciofani*, "Nutlin-loaded magnetic solid lipid nanoparticles for targeted glioblastoma treatment". Nanomedicine, 14(6), pp. 727-752, 2019 (* corresponding)

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 V. lacovacci*, L. Ricotti, <u>E. Sinibaldi</u>*, G. Signore, F. Vistoli and A. Menciassi, "An intravascular magnetic catheter enables the retrieval of nanoagents from the bloodstream". Advanced Science, 5, 1800807 (8 pages), 2018 (* corresponding) <u>Frontispiece of Advanced Science</u>

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A. Marino*, O. Tricinci*, M. Battaglini, C. Filippeschi, V. Mattoli, <u>E. Sinibaldi</u>* and G. Ciofani*, "A 3D real-scale, biomimetic and biohybrid model of the blood-brain barrier fabricated through two-photon lithography". Small, 14(6), 1702959 (9 pages), 2018 (* corresponding). <u>Inside front cover of Small</u>.

<u>Highlight in the European Research Council (ERC) Annual Report</u> on activities and achievements in 2018 [DOI: 10.1002/smll.201702959; ISI-ID (WOS): 000424656800010; Scopus-ID: 2-s2.0-85038029668]

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- G. Pizzichelli, B. Kehlet, Ø. Evju, B.A. Martin, M.E. Rognes, K.A. Mardal* and <u>E. Sinibaldi</u>*, "Numerical study of intrathecal drug delivery to a permeable spinal cord: effect of catheter position and angle". Computer Methods in Biomechanics and Biomedical Engineering, 20(15), pp. 1599-1608, 2017 (* corresponding)
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- A. Marino*, G.G. Genchi*, <u>E. Sinibaldi</u>* and G. Ciofani*, "Piezoelectric Effects of Materials on Biointerfaces". ACS Applied Materials and Interfaces, 9(21), pp. 17663-17680, 2017 (* corresponding)
 [DOI: 10.1021/acsami.7b04323; ISI-ID (WOS): 000402691600001; Scopus-ID: 2-s2.0-85020045251]
- A. Argiolas, G. L. Puleo, <u>E. Sinibaldi</u>* and B. Mazzolai*, "Osmolyte cooperation affects turgor dynamics in plants". Scientific Reports (Nature Research), 6, 30139 (8 pages), 2016 (* corresponding)
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- B. Kang, R. Kojcev and <u>E. Sinibaldi</u>*, "The first interlaced continuum robot, devised to intrinsically follow the leader". PLoS ONE, 11(2), e0150278 (16 pages), 2016 (* corresponding)
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- 23. L. Popova, A. Tonazzini, F. Di Michele, A. Russino, A. Sadeghi, <u>E. Sinibaldi</u>* and B. Mazzolai*, "Unveiling the kinematics of avoidance response in maize (Zea mays) primary roots". Biologia, 71(2), pp. 161-168, 2016 (* corresponding)

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24. M. Niccolini, V. Castelli, C. Diversi, B. Kang, F. Mussa and <u>E. Sinibaldi</u>^{*}, "Development and preliminary assessment of a robotic platform for neuroendoscopy based on a lightweight robot". International Journal of Medical Robotics and Computer Assisted Surgery, 12, pp. 4-17, 2016 (* corresponding)

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[DOI: 10.1002/rcs.1638; ISI-ID (WOS): 000372333700001; Scopus-ID: 2-s2.0-84959540864]

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 [DOI: 10.1016/j.mbs.2015.11.008; ISI-ID (WOS): 000369456200002; Scopus-ID: 2-s2.0-84957549788]
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27. <u>E. Sinibaldi</u>*, A. Argiolas, G.L. Puleo and B. Mazzolai*, "Another lesson from plants: the forward osmosis-based actuator". PLoS ONE, 9(7), e102461 (12 pages), 2014 (* corresponding)
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[DOI: 10.1137/120903385; ISI-ID (WOS): 000333537500003; Scopus-ID: 2-s2.0-84926232121]

29. C. Quaglia, S. Tognarelli, <u>E. Sinibaldi</u>*, N. Funaro, P. Dario and A. Menciassi, "Wireless robotic capsule for releasing bioadhesive patches in the gastrointestinal tract". ASME Journal of Medical Devices, 8(1), 014503 (6 pages), 2014 (* corresponding)

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- J. Bellazzini*, V. Benci*, C. Bonanno* and <u>E. Sinibaldi</u>*, "On the existence of hylomorphic vortices in the nonlinear Klein-Gordon equation". Dynamics of Partial Differential Equations 10(1), pp. 1-24, 2013 (* corresponding)
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- L.C. Berselli, P. Miloro, A. Menciassi and <u>E. Sinibaldi</u>*, "Exact solution to the inverse Womersley problem for pulsatile flows in cylindrical vessels, with application to magnetic particle targeting". Applied Mathematics and Computation, 219, pp. 5717-5729, 2013 (* corresponding)

[DOI: 10.1016/j.amc.2012.11.071; ISI-ID (WOS): 000313825900072; Scopus-ID: 2-s2.0-84872134910]

P. Miloro, <u>E. Sinibaldi</u>*, A. Menciassi and P. Dario, "Removing vascular obstructions: a challenge, yet an opportunity for interventional microdevices". Biomedical Microdevices 14(3), pp. 511-532, 2012 (* corresponding)

[DOI: 10.1007/s10544-011-9627-2; ISI-ID (WOS): 000303871400008; Scopus-ID: 2-s2.0-84861431140]

 S. Palagi, V. Pensabene, <u>E. Sinibaldi</u>*, L. Beccai, B. Mazzolai, V. Mattoli, P. Dario and A. Menciassi, "Controlled magnetic propulsion of floating polymeric two-dimensional nano-objects". Advanced Robotics 25(8), pp. 1029-1047, 2011 (* corresponding)

[DOI: 10.1163/016918611X568639; ISI-ID (WOS): 000291548500005; Scopus-ID: 2-s2.0-84856378070]

35. <u>E. Sinibaldi</u>*, V. Pensabene*, S. Taccola*, S. Palagi*, A. Menciassi*, P. Dario* and V. Mattoli*, "Magnetic nanofilms for biomedical applications". Journal of Nanotechnology in Engineering and Medicine 1(2), 021008 (4 pages), 2010 (* corresponding)

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36. J. Bellazzini^{*}, V. Benci^{*}, C. Bonanno^{*} and <u>E. Sinibaldi</u>^{*}, "Hylomorphic solitons in the nonlinear Klein-Gordon equation". Dynamics of Partial Differential Equations 6(4), pp. 311-334, 2009 (* corresponding)

[ISI-ID (WOS): 000272842600002; Scopus-ID: 2-s2.0-72549090877]

37. <u>E. Sinibaldi</u>*, F. Beux and M.V. Salvetti, "A numerical method for 3D barotropic flows in turbomachinery". Flow, Turbulence and Combustion 76(4), pp. 371-381, 2006 (* corresponding)

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[DOI: 10.1007/s10494-006-9025-7; ISI-ID (WOS): 000240729700007; Scopus-ID: 2-s2.0-33749018203]

F. Beux*, M.V. Salvetti*, A. Ignatyev*, D. Li*, C. Merkle* and <u>E. Sinibaldi</u>*, "A numerical study of non cavitating and cavitating liquid flow around a hydrofoil". ESAIM - Mathematical Modelling and Numerical Analysis (ESAIM: M2AN) 39(3), pp. 577-590, 2005 (* corresponding)

[DOI: 10.1051/m2an:2005023; ISI-ID (WOS): 000231076700009; Scopus-ID: 2-s2.0-22144438989]

> [Books]

1. <u>E. Sinibaldi</u>, "Implicit preconditioned numerical schemes for the simulation of three-dimensional barotropic flows", Edizioni della Normale, 2007

This research monograph presents numerical schemes for solving a class of (hyperbolic) conservation laws: building on fundamental theoretical results (on the Riemann problem associated with generic convex barotropic state laws), it bridges to real-world applications (namely propellant flows in liquid-propellant rocket engines)

[ISBN: 978-88-7642-310-9]

> [Invited Scientific Talks]

- 1. Invited speaker at: SES 2023 The 2023 Society of Engineering Science Annual Technical Meeting, minisymposium "Morphing Matter: Bioinspiration, Computational Design, Fabrication, Mechanics, and Sustainability", Minneapolis (Minnesota, USA), October 8-11, 2023. Talk title: "Analytical modeling to investigate/embody physical intelligence in biological and engineering systems"
- 2. <u>Keynote speaker</u> at: Soft Robotics Spring Days, University of Tartu, Tartu, Estonia, April 27-29, 2022. Talk title: "Intertwining Physical and Computational Intelligence for Soft Robotics"
- 3. Invited speaker at: MARSS 2020 The 5th International Conference on Manipulation, Automation and Robotics at Small Scales, special session "Multi-scale Soft and Continuum Robots in Medicine: Design, Modelling, Fabrication, and Control", Toronto (Canada), July 13-17, 2020 (postponed, then cancelled due to COVID-19 pandemic). Talk title: "Model-based and bioinspired design of soft/continuum robots for biomedical applications"
- 4. Invited speaker at: PhD Week PhD Programme in Clinical and Translational Science, University of Pisa, Pisa (Italy), October 3 2019. Talk title: "On selected imaginative engineering pathways to tackle biomedical problems"
- 5. Invited speaker at: Neurobioethics and Artificial Intelligence (Masterclass in Neurobioethics), Athenaeum Pontificium Regina Apostolorum (APRA), Rome (Italy), December 13, 2019. Talk title: "Selected challenges for Aldriven approaches to biomedical problems"
- 6. Invited speaker at: The ShanghAI Lectures (http://shanghailectures.org/), December 13, 2018. Talk title: "Modelbased orienteering: (selected topics on) where to go, where not to go, and imaginative trails"
- 7. Invited speaker (only one speaker) at: Quantitative Biomedicine Seminar, Weierstrass-Institute for Applied Analysis and Stochastics (WIAS), Berlin (Germany), February 1, 2018. Talk title: "Selected modeling approaches for biomedical applications and biorobotics tools"
- 8. <u>Keynote speaker</u> at: Neuroscience 2016 The 9th Global Neuroscience Conference, Melbourne (Australia), November 21-22, 2016. Talk title: "Biorobotics and modeling for the central nervous system"
- 9. Invited speaker at: Collaborative Conference on Robotics (CCR 2016), Phuket (Thailand), November 3-7, 2016. Talk title: "The interlaced continuum robot: towards follow-the-leader flexible tools"
- 10. Invited speaker at: 3D Lab Exchange Symposium Interaction of Nano-Biotechnology, Chemical and Medical Biology and Robotics, Pisa (Italy), September 21-23, 2016. Talk title: "Biorobotics and modeling for the central nervous system"
- 11. Invited speaker at: Energy Materials and Nanotechnology (EMN) Meeting on Membranes 2016, Dubai (United Arab Emirates), April 5-8, 2016. Talk title: "Plant-inspired osmotic actuation: a paradigm for biorobotics science and engineering"

- 12. <u>Plenary speaker</u> at: BioVisionAlexandria 2012, Bibliotheca Alexandrina, Alexandria, (Egypt), April 22-25, 2012. Talk title: "Selected Approaches and Challenges in Biorobotics Science and Engineering" [BioVisionAlexandria is an international conference gathering speakers from the realms of science (including Nobel Laureates), industry, policy-making, media and civil society, with focus on health, food and agriculture, and environment (www.bibalex.org/bva2020; www.bibalex.org/bva2012)]
- 13. Invited speaker at: 9th thematic workshop: Advanced Multimodality Endoscopic Instruments in the Detection, Diagnosis, Therapy, and Follow-Up of Diseases, Cerimed, Marseille (France), January 13-14, 2011. Talk title: "Medical microrobots for the human cardiovascular system"
- 14. Invited speaker at: Seminaire SMASH on modeles de cavitation, INRIA (Institut Nationale de Recherche en Informatique et Automatique), Sophia-Antipolis (France), February 17, 2003. Talk title: "A barotropic model for the numerical simulation of cavitating flows"

Media Coverage

[2022 (starting from May 31)] Media coverage on the achievements reported in the following research paper:
 L. Massari, G. Fransvea, J. D'Abbraccio, M. Filosa, G. Terruso, A. Aliperta, G. D'Alesio, M. Zaltieri, E. Schena, E. Palermo, E. Sinibaldi* and C.M. Oddo*, "Functional mimicry of Ruffini receptors with Fiber Bragg Gratings and Deep Neural Networks enables a bio-inspired large-area tactile sensitive skin". Nature Machine Intelligence, 4(5), pp. 425-435, 2022 (* corresponding) [DOI: 10.1038/s42256-022-00487-3]

> <u>Press</u>: ANSA, Rai News, Fortune, Corriere della Sera, etc.

> <u>Television</u>: Rai 1, etc.

[2019 (starting from April 5)] Media coverage on the achievements reported in the following research paper:

L. Massari, C.M. Oddo, E. Sinibaldi, R. Detry, J. Bowkett and K.C. Carpenter, "Tactile Sensing and Control of Robotic Manipulator Integrating Fiber Bragg Grating Strain-Sensor". Frontiers in Neurorobotics, 13, 8 (10 pages), 2019 [DOI: 10.3389/fnbot.2019.00008]

> Press:Xinhua News Agency, ANSA, etc.> Television:Rai 3, Sky Tg24

[2019 (starting from January 24)] Media coverage on the achievements reported in the following research paper:
 I. Must, E. Sinibaldi* and B. Mazzolai*, "A variable-stiffness tendril-like soft robot based on reversible osmotic actuation". Nature Communications 10(1), 344 (8 pages), 2019 (* corresponding) [DOI: 10.1038/s41467-018-08173-y]

 > Press:
 BBC News, EurekAlert!, ScienceDaily, AP, Dubai News Gate, Science et Vie, The Indian Express, ANSA, Le Scienze, la Repubblica, Il Sole 24 Ore, Wired, Rai News, etc.

 > Television:
 Rai 1 (Tg1), Rai 3, Sky Tg24, etc.

> <u>Radio/Podcast</u>: MRS Bulletin Materials, Radio due, RDS, etc.

[2018 (starting from August 6)] Media coverage on the achievements reported in the following research paper:
 V. Iacovacci*, L. Ricotti, E. Sinibaldi*, G. Signore, F. Vistoli and A. Menciassi, "An intravascular magnetic catheter

enables the retrieval of nanoagents from the bloodstream". Advanced Science, 5, 1800807 (8 pages), 2018 (* corresponding) [DOI: 10.1002/advs.201800807]

> <u>Press</u>: ANSA, Il Sole 24 Ore, etc.

[2018 (starting from February 8)] Media coverage on the achievements reported in the following research paper:
 A. Marino*, O. Tricinci*, M. Battaglini, C. Filippeschi, V. Mattoli, E. Sinibaldi* and G. Ciofani*, "A 3D real-scale, biomimetic and biohybrid model of the blood-brain barrier fabricated through two-photon lithography". Small, 14(6), 1702959 (9 pages), 2018 (* corresponding) [DOI: 10.1002/smll.201702959]

> <u>Press</u>: <u>EurekAlert!, Advanced Science News</u>, ANSA, Le Scienze, la Repubblica, etc.

- [2016 (starting from March 23)] Media coverage on the achievements reported in the following research paper:
 B. Kang, R. Kojcev and E. Sinibaldi*, "The first interlaced continuum robot, devised to intrinsically follow the leader", PLoS ONE, 11(2), e0150278 (16 pages), 2016 (* corresponding) [DOI: 10.1371/journal.pone.0150278]
 - > <u>Press</u>: ANSA, Corriere della Sera, la Repubblica, Libero, Wired, etc.
 - > <u>Television</u>: Rai News 24, Rai 3, Rai Community, etc.
 - > <u>Radio</u>: Radio Rai, Radio due, etc.

 [2015 (starting from July 22)] Media coverage on the achievements reported in the following research paper: A. Marino, S. Arai, Y. Hou, E. Sinibaldi, M. Pellegrino, Y.-T. Chang, B. Mazzolai, V. Mattoli, M. Suzuki and G. Ciofani, "Piezoelectric Nanoparticle-Assisted Wireless Neuronal Stimulation", ACS Nano, 9(7), pp. 7678-7689, 2015 [DOI: 10.1021/acsnano.5b03162]

CV

> <u>Press</u>: ANSA, la Repubblica, etc.

• [2011] Media coverage (March 17, 2011) on the workshop "Medical micro-robots: potential, challenges, strategies and dreams", co-organized by P. Dario and E. Sinibaldi, held at Istituto Italiano di Tecnologia, Center for Micro-BioRobotics (Pontedera, Italy) on March 7, 2011

> <u>Press</u>: Nòva, Il Sole 24 Ore (cover/main article)

Projects

Research Projects

 [2021/01 – 2024/12] <u>European RIA</u> project I-Seed ("Towards new frontiers for distributed environmental monitoring based on an ecosystem of plant seed-like soft robots"), funded by the European Commission (H2020; Future and Emerging Technologies work programme; <u>FET-Proactive</u> [Environmental Intelligence]; grant agreement ID: 101017940).

Role: <u>scientific collaborator</u> [modeling of <u>hygro-responsive natural systems</u> and artificial bilayers], as member of the coordinating partner iit (Bioinspired Soft Robotics group).

[2019/11 – 2022/11] <u>European CSA</u> project TWINNIMS ("Increasing the scientific excellence and technological innovation capacity in functional materials for medical devices and robotics of the University of Tartu"), funded by the European Commission (H2020; Spreading Excellence and Widening Participation 2018-2020 work programme; grant agreement ID: 857263).

Role: scientific collaborator [co-leading scientific contribution for the study of liquid-enabled actuation of compliant exoskeletons at the millimeter scale], as member of the project partner iit (Bioinspired Soft Robotics group)

[2019/01 – 2022/12] <u>European RIA</u> project GROWBOT ("Towards a new generation of plant-inspired growing artefacts"), funded by the European Commission (H2020; Future and Emerging Technologies work programme; <u>FET-Proactive</u> [Emerging Paradigms and Communities initiative]; project number: 824074).

Role: scientific collaborator [key scientific contribution focused on the study of <u>plant-inspired actuation</u> technologies], as member of the coordinating partner iit (Bioinspired Soft Robotics group).

The related scientific outputs include the following paper: I. Must, E. Sinibaldi* and B. Mazzolai*, "A variablestiffness tendril-like soft robot based on reversible osmotic actuation". <u>Nature Communications</u> 10(1), 344 (8 pages), 2019 (* corresponding) [DOI: 10.1038/s41467-018-08173-y], which was also <u>highlighted in Nature</u>

[2017/03 – 2022/02] <u>European ERC-STG</u> project SLaMM ("Magnetic solid lipid nanoparticles as a multifunctional platform against glioblastoma multiforme"), funded by the European Research Council (H2020; ERC-STG; grant agreement ID: 709613; grant holder: G. Ciofani; host institution: iit).

Role: scientific collaborator [key scientific contribution for model-based design of fluidic devices and modeling of magnetoresponsive carriers] of the grant holder's group.

The related scientific outputs include the following paper: A. Marino*, O. Tricinci*, M. Battaglini, C. Filippeschi, V. Mattoli, E. Sinibaldi* and G. Ciofani*, "A 3D real-scale, biomimetic and biohybrid model of the blood-brain barrier fabricated through two-photon lithography". <u>Small</u>, 14(6), 1702959 (9 pages), 2018 (* corresponding) [DOI: 10.1002/smll.201702959], which was also <u>highlighted</u> in 2019 in the <u>ERC Annual Report</u>, and which supported the funding of a derived ERC Proof-of-Concept project for the abovementioned grant holder)

• [2012/05 – 2015/04] <u>European STREP</u> project PLANTOID ("Innovative Robotic Artefacts Inspired by Plant Roots for Soil Monitoring"), funded by the European Commission (FP7; Future and Emerging Technologies work programme; <u>FET-Open</u>; grant number: 293431).

Role: scientific collaborator [key scientific contribution enabling the development of <u>plant-inspired osmotic</u> <u>actuators</u>: modeling, design, and prototyping/assessment], as member of the coordinating partner iit (Bioinspired Soft Robotics group)

[2010/12 – 2013/11] <u>National</u> project Micro-VAST ("Microsystem for VAscular diagnosticS and inTervention"), funded by Fondazione Cassa di Risparmio di Pisa
 Role: <u>scientific collaborator</u> [modeling of physiological flows and <u>magnetoresponsive endovascular devices</u>; scientific support to proposal preparation] of the coordinating partner Scuola Superiore Sant'Anna

CV

- [2009/02 2009/10] <u>European STREP</u> project ANGELS ("ANGuilliform robot with ELectric Sense"), funded by the European Commission (FP7; Future and Emerging Technologies work programme; <u>FET</u>; grant number: 231845)
 Role: scientific collaborator [key scientific/technical/management contribution to proposal preparation] as member of the project partner Scuola Superiore Sant'Anna
- [2009/01 2009/10] <u>National</u> project <u>PRIN</u> 2008 (prot. 2008EM9B92) "Integrated numerical and experimental study for the biomechanical characterization of the colon tissues", funded by the Italian Ministry of Education, Universities and Research (MIUR)

Role: scientific collaborator [key scientific/technical/management contribution to proposal preparation] as member of the coordinating partner Scuola Superiore Sant'Anna

 [2008/10 – 2009/10] <u>European IP</u> project INTEG-MICRO ("New production technologies of complex 3D microdevices through multi-process integration of ultra-precision engineering techniques"), funded by the European Commission (FP7; Cooperation work programme, theme <u>NMP</u>-2007-3.5-2; grant number: CP-IP 214013-2)

Role: scientific collaborator [co-leading scientific/technical/management contribution to proposal preparation] and technical manager as member of the coordinating partner Scuola Superiore Sant'Anna. I was strong involved in consortium building (I personally negotiated and achieved the participation of key end-users such as Swatch Group R&D Ltd). I <u>formally served as Assistant Project Manager</u>, by closely interacting with the Commission (Project Officer and Technical Advisor)

- [2008/02 2009/10] <u>European STREP</u> project LAMPETRA ("Life-like Artefacts for Motor-Postural Experiments and development of new control Technologies inspired by Rapid Animal locomotion"), funded by the European Commission (FP7; Cooperation work programme, theme ICT-2007.8.3 - <u>FET Proactive</u> 3; grant number: 216100) Role: <u>scientific collaborator</u> [numerical <u>modeling of underwater anguilliform robots</u>] and <u>technical manager</u> as member of the coordinating partner Scuola Superiore Sant'Anna)
- [2007/07 2009/10] <u>National</u> project <u>FIRB</u> 2006 (prot. RBIP0692HF) "Advanced manufacturing systems with impact on machine tools industry as well as on manufacturing divisions of 'Made in Italy' (textile, apparel, instrumental mechanics)", funded by the Italian Ministry of Education, Universities and Research (MIUR) Role: <u>technical manager</u> as member of the coordinating partner Scuola Superiore Sant'Anna
- [2007/10 2008/01] <u>National</u> project <u>PRIN</u> 2007 "Topological and variational methods in the study of nonlinear phenomena", funded by the Italian Ministry of Education, Universities and Research (MIUR)

Role: scientific collaborator [numerical modeling of solitons] of University of Bari (Mathematics Dept., Bari, Italy)

 [2007/01 – 2008/07] <u>European NoE</u> project VIMPA ("Vibrating microengines for power generation and microsystems actuation"), funded by the European Commission (FP6; NEST-2003-1 - Adventure activities; FP6-2003-NEST-A; Project ID: 511869)

Role: <u>scientific collaborator</u> [numerical <u>modeling of pneumatic systems</u>] as member of the coordinating partner Scuola Superiore Sant'Anna

- [2007/01 2007/12] <u>International</u> project OPTIMUS ("OPTimization and validation of a Mobile capsUle for endoScopy"), funded by <u>Intelligent Microsystem Center</u>, Korea Institute of Science and Technology (South Korea) Role: <u>scientific collaborator</u> [numerical <u>modeling of miniature biomedical robots</u>] as member of the leading partner Scuola Superiore Sant'Anna
- [2005/01 2005/12] <u>International project</u>, co-funded by <u>INRIA</u> (Institut Nationale de Recherche en Informatique et Automatique) and region Provence, Alpes, Côte d'Azur (France)
 Role: <u>scientific collaborator (main project investigator)</u> [high-performance computing of complex flows] of the main contracting partner University of Pisa (Aerospace Engineering Dept.)
- [2003/01 2005/12] <u>National</u> project FAST2 ("Future Advanced Space Transportation Technologies"), funded by the <u>Italian Space Agency</u> (ASI)

Role: <u>scientific collaborator (main project investigator)</u> [high-performance computing of cavitating flows] of the contracting partner University of Pisa (Aerospace Engineering Dept.)

Industrial Projects

• [2008/01 – 2008/12] Industrial project: deployment of a numerical model of a pre-commercial piezoelectric injector for automotive applications, funded by <u>Continental Automotive</u> Italy s.p.a.

CV

Role: scientific collaborator as member of the contracting party Scuola Superiore Sant'Anna

• [2008/01 – 2008/12] Industrial project: deployment of a numerical model for the developmental test-bench of an energy harvesting device, funded by Encrea s.r.l.

Role: scientific collaborator, external (i.e., as contracting party)

 [2001/12 – 2001/06] Industrial project: development of computational methods for the approximation of threedimensional surfaces typical of air-breathing engines through NURBS (Non Uniform Rational Basis-Splines) surfaces, funded by <u>Rolls-Royce plc</u>

Role: <u>main project investigator</u> as research intern at the Aerothermal Methods Dept. (Derby, UK); work documented through the internal Technical Report DNS 83334

Fundraising

During my main post-doctoral research period at Scuola Superiore Sant'Anna (SSSA), my activity was strongly directed towards competitive fundraising and project technical management. I successfully performed in competitive fundraising, by <u>winning the following projects/funds</u>:

- <u>FP7 European (IP) project</u> (INTEG-MICRO, grant number: CP-IP 214013-2); period: 2008 2012; budget: <u>10.8 M€</u>; EU funding: <u>7.4 M€</u>; funding for SSSA: <u>726 k€</u>;
- <u>FP7 European (STREP) project</u> (ANGELS, grant number: 231845); period: 2009 2012; budget: <u>4.0 M€</u>; EU funding: <u>3.1 M€</u>; funding for SSSA: <u>386 k€</u>;
- <u>PRIN National project</u> (PRIN 2008, prot. 2008EM9B92); period: 2010 2012; budget: <u>85 k€</u>; funding: <u>59 k€</u>; funding for SSSA: <u>32 k€</u>.

Considering my scientific education, knowledge/skills and interests, upon passing to Istituto Italiano di Tecnologia (iit) in 2010, I deliberately switched back to research. Contextually, I decided to <u>prioritize scientific</u> <u>publications</u> by strategically postponing further fundraising-related activities to the achievement of a publication record corresponding to my actual scientific activity. I <u>have not submitted grants</u> until obtaining two distinct national scientific qualifications as Associate Professor (namely for Applied Mechanics, and for Bioengineering), in 2017. Afterwards, considering the evolution of my working context (including some limitations to the possibility to formally lead scientific projects), <u>I have pragmatically extended the deliberate strategy to only pursue publications</u>. Nonetheless, I am glad to have <u>significantly supported</u>, through my collaborative scientific <u>work</u>, the obtainment of the following <u>further funding</u>:

- <u>ERC-PoC project</u> (BBBhybrid, grant agreement ID: 832045); period: 2019-2020; budget: 150 k€; EU funding: 150 k€; funding for the grant holder (G. Ciofani, with host institution iit): <u>150 k€</u>;
- <u>H2020 European (CSA) project</u> (TWINNIMS, grant agreement ID: 857263); period: 2019 2022; budget: 800 k€;
 EU funding: 800 k€; funding for iit (Bioinspired Soft Robotics research line): <u>226 k€</u>.

More at large, <u>my scientific work has continuously supported over time</u> a number of research projects, by also enabling key advancements (the significance of my contribution was formally acknowledged in many related joint publications where, e.g., I feature as corresponding author), possibly supporting additional fundraising.

• Academic Teaching and Supervision

Teaching

Although working for a <u>public research Institute that is not a University (at iit there are no teaching duties), I have</u> always gladly accepted the invitations as guest lecturer/professor received from Academic Institutions, and I have devoted careful attention and efforts to both students and lectures.

- [2022/10] <u>Invited Professor</u> at <u>University of Tartu</u> (Institute of Technology; Tartu, Estonia). Short course on "<u>Magnetic Actuation for Soft Robotics</u>" for MSc students in Soft Robotics (curricula: Robotics and Computer Engineering; Computer Engineering; Materials Science and Technology; Bioengineering), and BSc/MSc/PhD students with thesis/research projects aligned to soft robotics
- [2016 2020] <u>Guest Lecturer</u> for the "<u>Robotics for Surgery and Targeted Therapy</u>" course (held by Prof. A. Menciassi); <u>MSc program</u> in <u>Bionics Engineering</u> jointly offered by University of Pisa and Scuola Superiore Sant'Anna (Pisa, Italy); academic years 2016-2017, 2017-2018, 2018-2019, and 2019-2020
- [2011 2020] <u>External Member</u> of <u>PhD Committees</u> for the defense of PhD theses in Biorobotics at Scuola Superiore Sant'Anna (Pisa, Italy); with continuity since 2011
- [2011 2020] <u>External Member</u> of the <u>Evaluation Committee</u> for the admission to the <u>PhD program</u> in <u>Biorobotics</u> offered by Scuola Superiore Sant'Anna (Pisa, Italy); with continuity since 2011
- [2011] <u>Assistant Lecturer</u> for the "<u>Micro-Nano Robotics</u>" course (held by Prof. A. Menciassi); <u>PhD program</u> in <u>Innovative Technologies of Information & Communication Engineering and Robotics</u> offered by Scuola Superiore Sant'Anna (Pisa, Italy); academic year 2010-2011
- [2007 2013] <u>Assistant Lecturer</u> for the "<u>Biomedical Robotics</u>" course (held by Prof. P. Dario); <u>MSc program</u> in <u>Biomedical Engineering</u> offered by University of Pisa; academic years 2007-2008, 2008-2009, 2011-2012 and 2012-2013

Supervision of PhD and MSc/BSc Students

I am committed to diligently supervise both MSc/BSc students and PhD students. Besides supervising PhD students enrolled in collaborative programmes jointly funded/framed by an Academic Institution and my current Institute (namely iit, which is a public research Institute and not a university), <u>I have been formally acting as supervisor even beyond such collaborative schemes</u>, based on personal invitations (and without use of institutional funds), <u>by virtue of my scientific competence on the addressed research topic</u>.

I am committed to create opportunities for students and young researchers to extend their <u>knowledge</u> and develop their <u>skills</u>. I believe it is <u>ethically due</u>, as <u>well</u> as <u>strategic</u>, to carefully combine <u>teaching/supervision</u> with <u>mentorship</u>, <u>encouragement</u> and <u>assistance</u>, in order to provide them with <u>solid scientific foundations</u> while also fostering their <u>creativity</u> and <u>self-confidence</u>, at large.

I am glad for having educated many students and young researchers who are currently active, <u>at an international level</u>, both in <u>Academic Institutions</u> (e.g., as Assistant/Associate Professors at Korea Institute of Medical Microrobotics/Chonnam National University in South Korea, and Khalifa University in UAE) and <u>knowledge-based</u> <u>industry</u> (e.g., at Rolls-Royce, UK, and J&J/Google, USA). What is truly rewarding, besides their professional realization, is the value of the relationships we established and nurture.

• [2004 – present] <u>Academic supervision/tutoring</u> of <u>#11 PhD students</u>:

	Defense	Student	Academic	PhD	Thesis
	Date	(Surname, Name)	Institution	Program	Title
(1	TBA 2024/2025)	Valdur, Kadri-Ann (°)	University of Tartu (Tartu, Estonia)	Engineering and Technology	TBA (Vascular architecture for high-power- density muscular exorobot)

Defense Date	Student (Surname, Name)	Academic Institution	PhD Program	Thesis Title
03/07/2023	Masiero, Federico (º)	Scuola Superiore Sant'Anna (Pisa, Italy)	Biorobotics	The Myokinetic Interface: magnetic tracking and actuation for the restoration of dexterous control and proprioceptive feedback in transradial amputees
28/05/2020	Huan <i>,</i> Yu (*)	Scuola Superiore Sant'Anna (Pisa, Italy)	Biorobotics	Flexible surgical instruments for safe and effective minimally invasive surgery
18/05/2020	Lunni, Dario (*)	Scuola Superiore Sant'Anna (Pisa, Italy)	Biorobotics	Smart materials and manufacturing technologies for soft systems
31/05/2019	Massari, Luca (°)	Scuola Superiore Sant'Anna (Pisa, Italy)	Biorobotics	Tactile sensing and haptic technologies for biorobotic applications
31/05/2019	Saracino, Arianna ([#])	Scuola Superiore Sant'Anna (Pisa, Italy)	Biorobotics	Haptic feedback restoration in surgical teleoperated robotic platforms
07/06/2017	Kojcev, Risto (*)	Scuola Superiore Sant'Anna (Pisa, Italy)	Biorobotics	Ultrasound guided diagnostic and surgical robots
22/02/2016	Pizzichelli <i>,</i> Giulia (#)	Scuola Superiore Sant'Anna (Pisa, Italy)	Biorobotics	Modelling approaches of innovative drug delivery strategies for the central nervous system
28/04/2015	Kang, Bjungjeon (*)	Scuola Superiore Sant'Anna (Pisa, Italy)	Innovative Technologies of Information & Communication Engineering and Robotics	Development of a novel flexible probe and tools for a robotic platform enhancing surgeon-robot interaction
31/10/2014	Castelli, Virginia (*)	Scuola Superiore Sant'Anna (Pisa, Italy)	Innovative Technologies of Information & Communication Engineering and Robotics	Control of a robotic platform for neuroendoscopic applications
29/04/2014	Diversi, Costanza (*)	Scuola Superiore Sant'Anna (Pisa, Italy)	Innovative Technologies of Information & Communication Engineering and Robotics	Preoperative image processing for robotic applications in the central nervous system

(*) Scholarship jointly funded/framed by Academic Institution and Istituto Italiano di Tecnologia [Supervisor]

(°) Scholarship fully funded/framed by Academic Institution [no use of institutional funds; personal invitation; External Supervisor]

• [2004 – present] Academic supervision/tutoring of <u>#1 BSc student</u> and <u>#6 MSc students</u> from <u>multiple programs</u>:

Academic Year	Student (Surname, Name)	Academic Institution	MSc/BSc Program	Thesis Title
2018-2019	Masiero, Federico	Scuola Superiore Sant'Anna and University of Pisa	[MSc] <u>Bionics</u> Engineering	Development and characterization of a calibration algorithm for a myokinetic interface for prosthetic control
2011-2012	Di Leo, Monica	University of Pisa	[MSc] <u>Biomedical</u> Engineering	Utilizzo di metodi analitici per il calcolo delle forze di interazione magnetica in applicazioni endovascolari
2009-2010	De Palma, Valerio	Scuola Superiore Sant'Anna	[MSc] <u>Mechanical</u> Engineering	A modeling frame for the dynamics of simple Cosserat rods
2008-2009	Tramacere, Francesca	University of Pisa	[MSc] <u>Biomedical</u> Engineering	Sviluppo di uno strumento di simulazione per lo studio della locomozione attiva di dispositivi robotici all'interno del tratto gastrointestinale

Academic Year	Student (Surname, Name)	Academic Institution	MSc/BSc Program	Thesis Title
2008-2009	Renda, Federico	University of Pisa	[MSc] <u>Biomedical</u> Engineering	Modellazione dinamica per controllo di artefatto robotico flessibile bioispirato
2004-2005	Bilanceri, Marco	University of Pisa	[BSc] <u>Aerospace</u> Engineering	Studio dell'effetto della legge di stato nella simulazione di un flusso cavitante barotropico
2003-2004	Szorenyi, Alessandro	University of Pisa	[MSc] <u>Aerospace</u> Engineering	Contributo allo sviluppo e alla validazione di un codice per la simulazione numerica di flussi cavitanti tridimensionali

Academic Service and Further Research/Working Skills and Qualifications

Editorial Activity: International Scientific Journals

- [2021/11 present] <u>Associate Editor</u> for "<u>Frontiers in Bioengineering and Biotechnology</u>" ("Biomechanics" Section), published by Frontiers (www.frontiersin.org/journals/bioengineering-and-biotechnology)
- [2020/09 *present*] <u>Associate Editor</u> (<u>Editorial Board Member</u>) for "<u>Scientific Reports</u>" ("Biomedical Engineering" Section), published by Nature Research (www.nature.com/srep)
- [2020/06 present] <u>Academic Editor</u> for "<u>PLOS ONE</u>", published by PLOS (https://journals.plos.org/plosone)

Peer-Review Activity: International Research Proposals

- [2021 *present*] Reviewer for the <u>Dutch Research Council (NWO)</u>, for the following funding scheme (main scope: soft robotics):
 - Round NWO Talent Programme
- [2021 *present*] Reviewer for the <u>European Research Council (ERC)</u>, for the following funding scheme (main scope: biomechanics):
 - ERC Starting Grant
- [2021 present] Expert reviewer for the Swiss National Science Foundation (SNSF) (main scope: micro-robotics) for the following funding scheme:
 - SNSF Consolidator Grants
 - SNSF Eccellenza Professorial Fellowships
 - Project funding in Mathematics, Natural sciences and Engineering
- [2015 *present*] Expert reviewer for the <u>Research Grants Council (RGC) of Hong Kong</u> (tens of proposals; main scopes: bioengineering/biorobotics, micro-robotics and soft robotics) for the following funding schemes:
 - Strategic Topics Grant
 - General Research Fund
 - Collaborative Research Fund
 - Theme-based Research Scheme
 - Early Career Scheme
 - Young Collaborative Research Grant
 - ANR/RGC Joint Research Scheme between RGC and the French National Research Agency (ANR)
 - NSFC/RGC Joint Research Scheme between RGC and the National Natural Science Foundation of China (NSFC)

Peer-Review Activity: International Scientific Journals and Conferences

• [2005 – present] <u>Reviewer</u> for the following (#70) international scientific journals (listed in alphabetical order):

Journal Name	[Publisher]
ACS Applied Materials & Interfaces	[ACS]
ACS Applied Nano Materials	[ACS]
ACS Nano	[ACS]
Acta Biomaterialia	[Elsevier]
Actuators	[MDPI]
Advanced Intelligent Systems	[Wiley]
Advanced Materials Technologies	[Wiley]
Advanced Sensor Research	[Wiley]
Advanced Science	[Wiley]
Advances in Mathematical Physics	[Hindawi]
Annals of Biomedical Engineering	[Springer]
Applied Sciences	[MDPI]
ASME Journal of Mechanical Design	[ASME]
ASME Journal of Medical Devices	[ASME]
Autonomous Robots	[Springer]
Bioelectrochemistry	[Elsevier]
Bioinspiration & Biomimetics	[IOP Publishing]
Biomimetics	[MDPI]
Biophysical Journal	[Cell Press]
Computer Methods in Biomechanics and Biomedical Engineering	[Taylor & Francis]
Computers & Fluids	[Elsevier]
Electronics	
Endocrine	[Springer]
Engineering	[Eroptions]
Frontiers in Bobotics and Artificial Intelligence	[Frontiers]
IFFE Robotics and Automation Letters	
IEEE Robotics and Automation Magazine	(IEEE)
IEEE Transactions on Biomedical Engineering	(IEEE)
IEEE Transactions on Industrial Electronics	[IEEE]
IEEE Transactions on Medical Robotics and Bionics	[IEEE]
IEEE Transactions on NanoBioscience	[IEEE]
IEEE Transactions on Nanotechnology	[IEEE]
IEEE Transactions on Robotics	[IEEE]
IEEE/ASME Transactions on Mechatronics	[IEEE]
International Journal of Advanced Robotic Systems	[SAGE Publishing]
International Journal of Computational Fluid Dynamics	[Taylor & Francis]
International Journal of Computer Assisted Radiology and Surgery	[Springer]
International Journal of Nanomedicine	[Dove Medical Press Ltd.]
International Journal of Robotics Research	[SAGE Publishing]
International Journal of Thermal Sciences	[Elsevier]
Journal of Electromagnetic Waves and Applications	[Taylor & Francis]
Journal of Engineering in Medicine (Proc IMechE Part H)	[SAGE Publishing]
Journal of Intelligent & Robotic Systems	[Springer]
Journal of Medical Robotics Research	[World Scientific Publishing]

Journal Name	[Publisher]
Journal of Micro-Bio Robotics	[Springer]
Journal of Sensors	[Hindawi]
Macromolecular Rapid Communications	[Wiley]
Mathematical and Computer Modelling of Dynamical Systems	[Taylor & Francis]
Mathematics	[MDPI]
Measurement Science and Technology	[IOP Publishing]
Medical & Biological Engineering & Computing	[Springer]
Medical Engineering & Physics	[Elsevier]
Micromachines	[MDPI]
Minimally Invasive Therapy & Allied Technologies	[Taylor & Francis]
National Science Review	[Oxford Academic (OUP)]
Nature Machine Intelligence	[Nature Research]
Pharmaceutics	[MDPI]
PLoS ONE	[PLOS]
Robotics	[MDPI]
Robotics and Computer-Integrated Manufacturing	[Elsevier]
Scientific Reports	[Nature Research]
Sensors	[MDPI]
Sensors and Actuators: A. Physical	[Elsevier]
Small	[Wiley]
Smart Materials and Structures	[IOP Publishing]
Soft Robotics	[Mary Ann Liebert]
Symmetry	[MDPI]
The International Journal of Medical Robotics and Computer Assisted Surgery	[Wiley]

CV

• [2006 – present] <u>Reviewer</u> for the following (#9) international scientific conferences (listed in alphabetical order):

Computer/Robot Assisted Surgery (CRAS)
Hamlyn Symposium on Medical Robotics
IEEE International Conference on Robotics and Automation (ICRA)
IEEE International Conference on Soft Robotics (RoboSoft)
IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics (BioRob)
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)
International Conference on Autonomic and Autonomous Systems (ICAS)
International Conference on Biomimetic and Biohybrid Systems (Living Machines)

• [2012 – *present*] Reviewer for the Yearly Congress of the Italian National Bioengineering Group (GNB National Congress).

International Conference/Workshop Organization and Chairing

 [2018 – present] Technical Committee Member for the International Conference on Autonomic and Autonomous Systems (ICAS): ICAS2024 (Athens, Greece, March 10-14, 2024); ICAS2023 (Barcelona, Spain, March 13-17, 2023); ICAS2022 (Venice, Italy, May 22-26, 2022); ICAS2021 (Valencia, Spain, May 30 - June3, 2021); ICAS2020 (Venice, Italy, May 24-29, 2020); ICAS2019 (Athens, Greece, June 2-6, 2019); ICAS2018 (Nice, France, May 20-24, 2018)

CV

- [2016] <u>Session Chair</u> at Neuroscience 2016 The 9th Global Neuroscience Conference (session: "Neuroimaging, Neuro-physiology, Novel Therapeutics"), Melbourne (Australia), November 21-22, 2016
- [2014] <u>Session Chair</u> at NanotechITALY2014 (session: "Enabling Innovation in Pharma and Medical Devices"), Venezia (Italy), November 26-28, 2014
- [2011] <u>Scientific organizer</u> (with P. Dario) of the International Workshop "Medical micro-robots: potential, challenges, strategies and dreams" (speakers: P. Dario, J.-O. Park, S. Martel, F. Arai, K. Morishima, A. Ferreira and M. Sitti); Istituto Italiano di Tecnologia, Center for Micro-BioRobotics (Pontedera, Italy), March 7, 2011

Research Team/Collaborations

During my post-doctoral period at Scuola Superiore Sant'Anna (2006-2009), I collaborated with: <u>neuroscientists</u> (The Nobel Institute for Neurophysiology at Karolinska Institutet, Sweden); <u>computer scientists</u> (KTH, Sweden); <u>mathematicians</u> (Ecole des Mines de Nantes, France); <u>manufacturing engineers</u> (Cranfield University, UK; Fraunhofer-Gesellschaft, Germany; Tekniker, Spain; Katholieke Universiteit Leuven, Belgium); <u>worldwide leading</u> <u>companies in precision engineering</u> (Kern GmbH; The Swatch Group R&D Ltd).

In 2011 I had the chance to <u>seed a small, independent research team</u> at Istituto Italiano di Tecnologia (iit), made of <u>PhD students</u>, mainly addressing <u>biomedical applications</u>. I grew the team by combining <u>theoretical modeling</u> with <u>robotic platforms</u> and <u>devices</u>, as complementary pillars, integral to a <u>unified scientific vision and approach</u>. While augmenting the scientific knowledge/skills of each and every team member, I led them by fostering inclusive participation, cross-fertilization, fairness, trust and mutual support. <u>Unfortunately, in relation to organizational evolutions, it was not possible to sustain team development, in particular by also enrolling senior members, and, starting from 2015/2016, even juniors' turnover was unmatched, thus irreversibly deflating the research group. Nonetheless, thanks to the devised strategy and workplan, and also based on a strong personal commitment, <u>I fully supported each team member until they successfully completed their activities and took further career steps at an international level (see the CV section on supervision of PhD and MSc/BSc students), also thanks to the established scientific collaborations. Indeed, leveraging my multidisciplinary background, I have collaborated with, e.g., <u>engineers/roboticists</u>, physicists/chemists, material scientists, neuroscientists, mathematicians, biologists, life-science researchers and medical doctors/scientists. Collaboration with clinical partners, in particular, was strategic to support the potential for translation of related joint studies in the biomedical field.</u></u>

As concerns <u>models for biomedical applications</u>, e.g., I collaborated with: University of Oslo (Norway); University of Idaho (ID, US); University of Pisa (Italy); Scuola Superiore Sant'Anna (Italy); Waseda University (Japan). As for <u>robotic platforms</u>: Imperial College London (UK); Johns Hopkins University (MD, USA); Technische Universität München (Germany); Scuola Superiore Sant'Anna (Italy). As regards <u>tools</u>: University of Pisa (Italy); University of Florence (Italy); Scuola Superiore Sant'Anna (Italy); University of Twente (Netherlands). <u>On the clinical side</u>, I collaborated with: Cisanello University Hospital (Pisa, Italy); Careggi University Hospital (Florence, Italy); Johns Hopkins Medical Institutions (Baltimore, MD, USA); Meyer Pediatric Hospital (Florence, Italy).

In parallel, through my research activity in <u>soft robotics</u> I have established/joined further scientific collaborations with: University of Tartu (Estonia); Cornell University (NY, USA); University of Freiburg (Germany); University of Florence (Italy); Campus Biomedico University of Rome (Italy); Scuola Superiore Sant'Anna (Italy); Caltech (CA, USA).

<u>I am keen on further extending scientific connections and collaborations to promote knowledge build-up, mutual</u> <u>understanding, integral development and constructive relations at a global level.</u>

Research Fellowships

- [2009/10 2009/12] Granted by University of Pisa (Oncology, Transplants and Advanced Technologies in Medicine Dept.); topic: development of (modeling for) robotic systems and aids for computer-assisted surgery in endoluminal operations on the stomach and abdominal organs
- [2007/10 2008/01] Granted by University of Bari (Mathematics Dept.); topic: <u>numerical simulation</u> of stable solitary waves (<u>solitons</u>)
- [2002/06 2005/11] (sectioned as: 2002/06-09, 2003/03–06, 2003/10–12, 2004/03-07, 2005/05-11) Granted by University of Pisa (Aerospace Engineering Dept.); topic: <u>numerical simulation</u> of <u>cavitating flows</u> occurring in aerospace propulsion systems (<u>rocket engines, turbo-pump inducers</u>)

Memberships

- [2017/05 present] Member of the American Society of Mechanical Engineers (ASME)
- [2016/01 present] Member of the International Hydrocephalus Imaging Working Group (IHIWG)
- [2012/05 *present*] Member of the Institute of Electrical and Electronic Engineers (IEEE), and of the related Robotics and Automation Society (IEEE/RAS)

Computer Skills and Qualifications

- Scientific programming: "Certified MATLAB Professional" (two international certificates; Cambridge, UK, 2015/2016)
- Scientific programming: C/C++, Fortran, Matlab; parallel programming (MPI, OpenMP); code tuning/optimization
- Common s/w tools (MS-Office, Latex, Comsol Multiphysics, etc.)
- Operating Systems: Windows, Linux (Unix)

Language Skills

- English: fluent
- Italian: mother tongue



Scientific Publications and Communications

[Scopus ID: 8432739000; ORCID ID: 0000-0002-9755-3431; Web of Science Researcher ID: AAV-9599-2021]

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- S. Palagi, V. Pensabene, <u>E. Sinibaldi</u>*, L. Beccai, B. Mazzolai, V. Mattoli, P. Dario and A. Menciassi, "Controlled magnetic propulsion of floating polymeric two-dimensional nano-objects". Advanced Robotics 25(8), pp. 1029-1047, 2011 (* corresponding)

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56. B. Mazzolai, A. Mondini, P. Corradi, C. Laschi, V. Mattoli, <u>E. Sinibaldi</u> and P. Dario, "A Miniaturized Mechatronic System Inspired by Plant Roots for Soil Exploration". IEEE Transactions on Mechatronics 16(2), pp. 201-212, 2011. <u>Winner of the '2012 TMECH Best Paper' Award</u>

[DOI: 10.1109/TMECH.2009.2038997; ISI-ID (WOS): 000286386000001; Scopus-ID: 2-s2.0-78951469608]

57. <u>E. Sinibaldi</u>*, V. Pensabene*, S. Taccola*, S. Palagi*, A. Menciassi*, P. Dario* and V. Mattoli*, "Magnetic nanofilms for biomedical applications". ASME Journal of Nanotechnology in Engineering and Medicine 1(2), 021008 (4 pages), 2010 (* corresponding)

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- J. Bellazzini*, V. Benci*, C. Bonanno* and <u>E. Sinibaldi</u>*, "Hylomorphic solitons in the nonlinear Klein-Gordon equation". Dynamics of Partial Differential Equations 6(4), pp. 311-334, 2009 (* corresponding)
 [ISI-ID (WOS): 000272842600002; Scopus-ID: 2-s2.0-72549090877]
- 59. <u>E. Sinibaldi</u>*, F. Beux and M.V. Salvetti, "A numerical method for 3D barotropic flows in turbomachinery". Flow, Turbulence and Combustion 76(4), pp. 371-381, 2006 (* corresponding)

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60. F. Beux*, M.V. Salvetti*, A. Ignatyev*, D. Li*, C. Merkle* and <u>E. Sinibaldi</u>*, "A numerical study of non cavitating and cavitating liquid flow around a hydrofoil". ESAIM - Mathematical Modelling and Numerical Analysis (ESAIM: M2AN) 39(3), pp. 577-590, 2005 (* corresponding)

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Conference Papers (International Conferences, Peer-Reviewed)

 S. Prasanna, L. Massari, <u>E. Sinibaldi</u>, R. Detry, J. Bowkett, K. Carpenter and C.M. Oddo, "Neuromorphic tactile sensor array based on Fiber Bragg Gratings to encode object qualities". Proc. SPIE 11136, Optics and Photonics for Information Processing XIII, San Diego (California, USA), August 13-14, 1113608, 2019

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 J. D'Abbraccio, A. Aliperta, C.M. Oddo, M. Zaltieri, E. Palermo, L. Massari, G. Terruso, <u>E. Sinibaldi</u>, M. Kowalczyk, and E. Schena, and, "Design and Development of Large-Area FBG-Based Sensing Skin for Collaborative Robotics". Proceedings of MetroInd 4.0 and IoT 2019 – 2019 IEEE International Workshop on Metrology for Industry 4.0 and IoT, Naples (Italy), June 4-6, pp. 410-413, 2019

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 V. Iacovacci, L. Ricotti, G. Signore, F. Vistoli, <u>E. Sinibaldi</u>, and A. Menciassi, "Retrieval of magnetic medical microrobots from the bloodstream". Proceedings of ICRA 2019 – 2019 IEEE International Conference on Robotics and Automation, Montreal (Canada), May 20-24, pp. 2495-2501, 2019

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4. D. Lunni, E. Del Dottore, A. Sadeghi, M. Cianchetti, <u>E. Sinibaldi</u> and B. Mazzolai, "Investigation of tip extrusion as an additive manufacturing strategy for growing robots". Lecture Notes in Computer Science 10928 LNAI, pp. 288-299, 2018

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- O. Zettinig, B. Fuerst, R. Kojcev, M. Esposito, M. Salehi, W. Wein, J. Rackerseder, <u>E. Sinibaldi</u>, B. Frisch and N. Navab, "Toward Real-Time 3D Ultrasound Registration-Based Visual Servoing for Interventional Navigation". Proceedings of ICRA 2016 – 2016 IEEE International Conference on Robotics and Automation, Stockholm (Sweden), May 16-21, pp. 945-950, 2016

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 B. Kang, V. Castelli, C. Diversi, M. Niccolini, B. Mazzolai, F. Mussa and <u>E. Sinibaldi</u>*, "Towards Accurate Robot-Assisted Neuroendoscopy using an Ergonomic Handling Interface and a Lightweight Robot". Proceedings of EMBC'14 – 36th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Chicago (Illinois, USA), August 26-30, pp. 6876-6879, 2014 (* corresponding)

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M. Salerno*, R. Rizzo*, <u>E. Sinibaldi</u>* and A. Menciassi*, "Force calculation for localized magnetic driven capsule endoscopes". Proceedings of ICRA 2013 – 2013 IEEE International Conference on Robotics and Automation, Karlsruhe (Germany), May 6-10, pp. 5354-5359, 2013 (* corresponding)

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 P. Miloro, M. Khorami Llewellyn, S. Tognarelli, G. Ciuti, <u>E. Sinibaldi</u>, P. Dario and A. Menciassi, "An Innovative Platform for Treatment of Vascular Obstructions: System Design and Preliminary Results". Proceedings of BioRob 2012 – 2012 IEEE International Conference on Biomedical Robotics and Biomechatronics, Roma (Italy), June 24-27, pp. 731-736, 2012

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 M. Khorami Llewellyn, P. Dario, A. Menciassi and <u>E. Sinibaldi</u>, "Magnetic Dragging of Vascular Obstructions by Means of Electrostatic and Antibody Binding". Proceedings of ICRA 2012 – 2012 IEEE International Conference on Robotics and Automation, Saint Paul (Minnesota, USA), May 14-18, pp. 2504-2509, 2012. <u>Finalist (top 5) for</u> <u>the 'Best Medical Robotics Paper' Award</u>

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 F. Tramacere, L. Beccai, F. Mattioli, <u>E. Sinibaldi</u> and B. Mazzolai, "Artificial Adhesion Mechanisms inspired by Octopus Suckers". Proceedings of ICRA 2012 – 2012 IEEE International Conference on Robotics and Automation, Saint Paul (Minnesota, USA), May 14-18, pp. 3846-3851, 2012

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13. F. Tramacere, L. Beccai, <u>E. Sinibaldi</u>, C. Laschi and B. Mazzolai, "Adhesion mechanisms inspired by octopus suckers". Procedia Computer Science 7, pp. 192-193, 2011

[DOI: 10.1016/j.procs.2011.09.053; ISI-ID (WOS): 000299100900063; Scopus-ID: 2-s2.0-84856418196]

 Menciassi, <u>E. Sinibaldi</u>, V. Pensabene and P. Dario, "From Miniature to Nano Robots for Diagnostic and Therapeutic Applications". Proceedings of EMBC2010 – 32nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Buenos Aires (Argentina), August 31 - September 4, pp. 1954-1957, 2010

[DOI: 10.1109/IEMBS.2010.5627629; ISI-ID (WOS): 000287964002090; Scopus-ID: 2-s2.0-78650953294]

 V. Mattoli, <u>E. Sinibaldi</u>, V. Pensabene, S. Taccola, A. Menciassi and P. Dario, "Magnetic nanosheets manipulation: modeling, development and validation". Proceedings of ICRA 2010 – 2010 IEEE International Conference on Robotics and Automation, Anchorage (Alaska, USA), May 3-8, pp. 1604-1609, 2010

[DOI: 10.1109/ROBOT.2010.5509933; Scopus-ID: 2-s2.0-77955801106]

 U. Scarfogliero, G. Bonsignori, C. Stefanini, <u>E. Sinibaldi</u>, F. Li, D. Chen and P. Dario, "Bioinspired jumping locomotion in small robots: natural observation, design, experiments". In "Experimental Robotics – The Eleventh International Symposium" (O. Kathib, V. Kumar and G. Pappas Eds.), Springer Tracts in Advanced Robotics 54, pp. 329-338, Springer, 2009

[DOI: 10.1007/978-3-642-00196-3_38; ISBN: 978-3-642-00195-6; ISI-ID (WOS): 000268803300031; Scopus-ID: 2-s2.0-78650431597]

- <u>E. Sinibaldi</u>*, F. Beux* and M.V. Salvetti*, "A preconditioned compressible flow solver for numerical simulation of 3D cavitation phenomena". Proceedings of ECCOMAS2004 - 4th European Congress on Computational Methods in Applied Sciences and Engineering, Jyväskylä (Finland), July 24-28, 20 pages, 2004 (* corresponding) [Scopus-ID: 2-s2.0-22144495860]
- 18. <u>E. Sinibaldi</u>*, F. Beux*, M.V. Salvetti* and L. d'Agostino*, "Numerical experiments with a homogeneous-flow model for thermal cavitation". Proceedings of CAV2003 Fifth International Symposium on Cavitation, Osaka (Japan), November 1-4, 12 pages, 2003 (* corresponding)

Books

1. <u>E. Sinibaldi</u>, "Implicit preconditioned numerical schemes for the simulation of three-dimensional barotropic flows", Edizioni della Normale, 2007

This research monograph presents numerical schemes for solving a class of (hyperbolic) conservation laws: building on fundamental theoretical results (on the Riemann problem associated with generic convex barotropic state laws), it bridges to real-world applications (namely propellant flows in liquid-propellant rocket engines)

[ISBN: 978-88-7642-310-9]

Book Chapters

T. Czimmermann, L. Massari, J. D'Abbraccio, G. Terruso, M. Zaltieri, G. Fransvea, A. Aliperta, E. Palermo, E. Schena, <u>E. Sinibaldi</u> and C.M. Oddo, "Physical contact localization with artificial intelligence and large-area Fiber Bragg Grating tactile sensors for collaborative biorobotics". In "Electronic Skin: Sensors and Systems" (A. Ibrahim and M. Valle Eds.), River Publishers, pp. 101-112, 2020

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[ISBN: 9788770222167, 9788770222150, Scopus-ID: 2-s2.0-85106634660]

2. B. Mazzolai, V. Mattoli, L. Beccai and <u>E. Sinibaldi</u>, "Emerging technologies inspired by plants". In "Bioinspired Approaches for Human-Centric Technologies" (R. Cingolani Ed.), Springer, pp. 111-132, 2014

[DOI: 10.1007/978-3-319-04924-3_4; ISBN: 978-331904923-6; Scopus-ID: 2-s2.0-84955409241]

 M.V. Salvetti, <u>E. Sinibaldi</u> and F. Beux, "Cavitation simulation by a homogeneous barotropic flow model". In "Fluid Dynamics of Cavitation and Cavitating Turbo-pumps" (L. d'Agostino and M.V. Salvetti Eds.), CISM Courses and Lectures 496, pp. 317-351, Springer, 2008

[DOI: 10.1007/978-3-211-76669-9; ISBN: 978-3-211-76668-2, 978-3-211-99920-2]

Conference Extended Abstracts (International Conferences, Peer-Reviewed)

- A. Saracino, T.J.C. Oude Vrielink, <u>E. Sinibaldi</u>, A. Menciassi and G. Mylonas, "Haptics-enabled palpation for intraoperative tumour detection using a cable-driven parallel manipulator". CRAS 2018 – 8th Joint Workshop on New Technologies for Computer/Robot Assisted Surgery, London (UK), September 10-11, pp. 71-72, 2018
- <u>E. Sinibaldi</u>, "Striving to overcome the (blood-brain) barrier: models for intrathecal drug delivery and infusion into brain tissue". ECCM – ECFD 2018 (ECCOMAS 2018): 6th European Conference on Computational Mechanics, and 7th European Conference on Computational Fluid Dynamics [MS87: Mathematical and computational modelling of fluid flow and transport in the brain and spinal cord], Glasgow (UK), June 11-15, (1 page), 2018
- A. Marino, O. Tricinci, M. Battaglini, V. Mattoli, <u>E. Sinibaldi</u> and G. Ciofani, "A 3D biomimetic model of the bloodbrain barrier fabricated with a two-photon lithography approach". Proceedings of ESB 2017 – 28th Annual Conference of the European Society for Biomaterials, Athens (Greece), September 4-8, pp.232, 2017
- G.G. Genchi, M. Labardi, A. Marino, L. Ceseracciu, M. Comito, <u>E. Sinibaldi</u> and G. Ciofani, "SaOS-2 osteoblast-like cells differentiation is enhanced by piezoelectric P(VDF-TrFE)/BNNTs composite films stimulated with ultrasound". Proceedings of ESB 2017 28th Annual Conference of the European Society for Biomaterials, Athens (Greece), September 4-8, pp.277, 2017
- L. Massari, P. Saccomandi, F. Sorgini, <u>E. Sinibaldi</u>, G. Ciuti, A. Menciassi, P. Cappa, E. Schena and C.M. Oddo, "Tactile sensor array integrating fiber Bragg grating transducers for biomechanical measurement". Proceedings of CRAS 2016 – 6th Joint Workshop on New Technologies for Computer/Robot Assisted Surgery, Pisa (Italy), September 12-14, paper n.49 (2 pages), 2016
- R. Kojcev, B. Kang and <u>E. Sinibaldi</u>, "Towards robotic needle steering using ultrasound visual servoing and a lightweight robot". Proceedings of CARS 2015 – 29th International Congress and Exhibition on Computer Assisted Radiology and Surgery, Barcelona (Spain), June 24-27, 2015. Published in International Journal of Computer Assisted Radiology and Surgery 10 Suppl 1, pp. S122-S123, 2015
- M. Niccolini, V. Castelli, C. Diversi, B. Kang, B. Mazzolai and <u>E. Sinibaldi</u>, "Accurate control of a lightweight robotic arm, towards surgical robotics applications". Proceedings of CARS 2013 – 27th International Congress and Exhibition on Computer Assisted Radiology and Surgery, Heidelberg (Germany), June 26-29, 2013. Published in International Journal of Computer Assisted Radiology and Surgery 8 Suppl 1, pp. S128-S129, 2013
- M. Niccolini, C. Diversi, B. Kang, V. Castelli, B. Mazzolai and <u>E. Sinibaldi</u>, "SINGER: a virtual SImulator for robotic NeurosurGERy". Proceedings of the 6th Hamlyn Symposium on Medical Robotics, London (UK), June 22-25, pp. 25-26, 2013
- L.C. Berselli, B. Mazzolai and <u>E. Sinibaldi</u>, "Pulsatile flows in circular and elliptical vessels: solution to the inverse problem, with application to blood flow". Proceedings of MPF2013 – Modelling of Physiological Flows, Chia Laguna (Italy), June 11-14, pp. 59-60, 201
- C. Di Natali, G. Ciuti, V. Castelli, S. Tognarelli, <u>E. Sinibaldi</u>, P. Dario and A. Menciassi, "Platform for Magnetic Propulsion and Ultrasound Tracking of Endovascular Devices". Proceedings of the 4th Hamlyn Symposium on Medical Robotics, London (UK), June 19-20, pp. 29-30, 2011

11. M. Bilanceri, <u>E. Sinibaldi</u>, F. Beux and M.V. Salvetti, "A preconditioned second-order linearized implicit formulation for barotropic cavitating flows". Proceedings of ECCOMAS2008 - 5th European Congress on Computational Methods in Applied Sciences and Engineering, Venice (Italy), June 30 - July 5, 2 pages, 2008

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Invited Scientific Talks

- Invited speaker at: SES 2023 The 2023 Society of Engineering Science Annual Technical Meeting, minisymposium "Morphing Matter: Bioinspiration, Computational Design, Fabrication, Mechanics, and Sustainability", Minneapolis (Minnesota, USA), October 8-11, 2023. Talk title: "Analytical modeling to investigate/embody physical intelligence in biological and engineering systems"
- 2. <u>Keynote speaker</u> at: Soft Robotics Spring Days, University of Tartu, Tartu, Estonia, April 27-29, 2022. Talk title: "Intertwining Physical and Computational Intelligence for Soft Robotics"
- 3. Invited speaker at: MARSS 2020 The 5th International Conference on Manipulation, Automation and Robotics at Small Scales, special session "Multi-scale Soft and Continuum Robots in Medicine: Design, Modelling, Fabrication, and Control", Toronto (Canada), July 13-17, 2020 (postponed, then cancelled due to COVID-19 pandemic). Talk title: "Model-based and bioinspired design of soft/continuum robots for biomedical applications"
- 4. Invited speaker at: PhD Week PhD Programme in Clinical and Translational Science, University of Pisa, Pisa (Italy), October 3 2019. Talk title: "On selected imaginative engineering pathways to tackle biomedical problems"
- 5. Invited speaker at: Neurobioethics and Artificial Intelligence (Masterclass in Neurobioethics), Athenaeum Pontificium Regina Apostolorum (APRA), Rome (Italy), December 13, 2019. Talk title: "Selected challenges for Aldriven approaches to biomedical problems"
- 6. Invited speaker at: The ShanghAI Lectures (http://shanghailectures.org/), December 13, 2018. Talk title: "Modelbased orienteering: (selected topics on) where to go, where not to go, and imaginative trails"
- 7. Invited speaker (only one speaker) at: Quantitative Biomedicine Seminar, Weierstrass-Institute for Applied Analysis and Stochastics (WIAS), Berlin (Germany), February 1, 2018. Talk title: "Selected modeling approaches for biomedical applications and biorobotics tools"
- 8. <u>Keynote speaker</u> at: Neuroscience 2016 The 9th Global Neuroscience Conference, Melbourne (Australia), November 21-22, 2016. Talk title: "Biorobotics and modeling for the central nervous system"
- 9. Invited speaker at: Collaborative Conference on Robotics (CCR 2016), Phuket (Thailand), November 3-7, 2016. Talk title: "The interlaced continuum robot: towards follow-the-leader flexible tools"
- 10. Invited speaker at: 3D Lab Exchange Symposium Interaction of Nano-Biotechnology, Chemical and Medical Biology and Robotics, Pisa (Italy), September 21-23, 2016. Talk title: "Biorobotics and modeling for the central nervous system"
- 11. Invited speaker at: Energy Materials and Nanotechnology (EMN) Meeting on Membranes 2016, Dubai (United Arab Emirates), April 5-8, 2016. Talk title: "Plant-inspired osmotic actuation: a paradigm for biorobotics science and engineering"
- 12. <u>Plenary speaker</u> at: BioVisionAlexandria 2012, Bibliotheca Alexandrina, Alexandria, (Egypt), April 22-25, 2012. Talk title: "Selected Approaches and Challenges in Biorobotics Science and Engineering". [BioVisionAlexandria is an international conference gathering speakers from the realms of science (including Nobel Laureates), industry, policy-making, media and civil society, with focus on health, food and agriculture, and environment (www.bibalex.org/bva2020; www.bibalex.org/bva2012)]
- 13. Invited speaker at: 9th thematic workshop: Advanced Multimodality Endoscopic Instruments in the Detection, Diagnosis, Therapy, and Follow-Up of Diseases, Cerimed, Marseille (France), January 13-14, 2011. Talk title: "Medical microrobots for the human cardiovascular system"
- 14. Invited speaker at: Seminaire SMASH on modeles de cavitation, INRIA (Institut Nationale de Recherche en Informatique et Automatique), Sophia-Antipolis (France), February 17, 2003. Talk title: "A barotropic model for the numerical simulation of cavitating flows"

Invited Dissemination Talks

- 1. Invited speaker at: Corsi di Orientamento della Normale 2021, virtual event, July 24, 2021. Talk title (in Italian): "Alcune sfide della robotica biomedica, tra modelli, dati, strategie e creatività". [Orientation program, organized by Scuola Normale Superiore (Pisa, Italy), for selected (on the basis of merit) students in the penultimate year of Italian and foreign high schools]
- 2. Invited speaker at: Corsi di Orientamento della Normale 2020, virtual event, July 18, 2020. Talk title (in Italian): "Orientarsi grazie ai modelli matematici: dove andare, dove non andare, e come passare da J.S. Bach a una sonda biorobotica" [Orientation program, organized by Scuola Normale Superiore (Pisa, Italy), for selected (on the basis of merit) students in the penultimate year of Italian and foreign high schools]
- Invited speaker at: Intelligenza Artificiale Ricadute sul Processo, virtual event, May 8, 2020. Talk title (in Italian): "On Al-related Legal Aspects: Reflections from a Biomedical Robotics Perspective". [Dissemination event organized by Fondazione Forense di Monza, Ordine degli Avvocati di Monza, Monza, Italy]
- 4. Invited speaker at: InnovAgorà ("Smart Manufacturing: Innovative materials, Robotics and ICT" session), Milan (Italy), May 6-8, 2019. Talk (in Italian) title: "Struttura dispiegabile a mantenimento di forma includente una coppia di sistemi robotici di tipo continuo", on the European Patent EP 3288438. [Technology transfer event organized by the Italian Ministry of Education, University and Research, dedicated to the promotion of public research results, and in particular selected patented technologies, towards companies and investors]

Scientific Talks

- Speaker at: I-RIM 3D 2020: 2nd Italian Conference on Robotics and Intelligent Machines, virtual event, Dec 10-12, 2020. Talk title: "Plant-Inspired Actuation Strategies for Biorobotics"
- Speaker at: ECCM ECFD 2018 (ECCOMAS 2018): 6th European Conference on Computational Mechanics, and 7th European Conference on Computational Fluid Dynamics, Glasgow (UK), June 11-15, 2018 (MS87: Mathematical and computational modelling of fluid flow and transport in the brain and spinal cord). Talk title: "Striving to overcome the (blood-brain) barrier: models for intrathecal drug delivery and infusion into brain tissue"
- Speaker at: EMBC'14 36th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Chicago (Illinois, USA), August 26-30, 2014. Talk title: "Towards Accurate Robot-Assisted Neuroendoscopy using an Ergonomic Handling Interface and a Lightweight Robot"
- 4. Speaker at: MPF2013 Modelling of Physiological Flows, Chia Laguna (Italy), June 11-14, 2013. Talk title: "Pulsatile flows in circular and elliptical vessels: solution to the inverse problem, with application to blood flow"
- 5. Speaker at: CAV2003 Fifth International Symposium on Cavitation, Osaka (Japan), November 1-4, 2003. Talk title: "Numerical experiments with a homogeneous-flow model for thermal cavitation"

[Further Publ./Comm.] Conference Posters (International Conferences, possibly Peer-Reviewed)

- A. Argiolas, G.L. Puleo, <u>E. Sinibaldi</u> and B. Mazzolai, "A novel plant-inspired osmotic actuator for robotics applications", IROS 2015 The 2015 IEEE/RSJ International Conference on Intelligent Robots and Systems, Hamburg (Germany), September 28 October 2, 2015
- C. Lucarotti, A. Argiolas, R. Kojcev, <u>E. Sinibaldi</u>, B. Mazzolai, C. Laschi and L. Beccai, "A multilayer soft artificial skin for embodied tactile feedback", ICRA 2015 – 2015 IEEE International Conference on Robotics and Automation, workshop on "Soft Robotics: Actuation, Integration, and Applications - Blending Research Perspectives", Seattle (Washington, USA), May 30, 2015
- C. Diversi, M. Salerno, B. Kang, I. Desideri, M. Cosottini, B. Mazzolai and <u>E. Sinibaldi</u>, "Innovative Robotic Approaches for Minimally Invasive Intervention in the Human Cerebral Ventricular System". NEMB2012 The First NEMB Venice Workshop on Cancer Nanotechnology, Venezia (Italy), October 11-12, 2012
- F. Di Michele, C. Diversi, F. Guerra, B. Kang, V. Castelli, L.C. Berselli, B. Mazzolai and <u>E. Sinibaldi</u>, "Mathematical Model for the Cerebrospinal Fluid Flow in the CranioVertebral Junction". Applied Partial Differential Equations in Physics, Biology and Social Sciences: Classical and Modern Perspectives, Centre de Recerca Matemàtica, Bellaterra (Spain), September 2-7, 2012

• F. Tramacere, L. Beccai, <u>E. Sinibaldi</u>, C. Laschi and B. Mazzolai, "Study of the morphology of *Octopus vulgaris* sucker as a model for innovative artificial adhesion mechanisms". Euroceph meeting 2011: Cephalopod Biology Research in the 21st Century - A European Perspective, Vico Equense (Italy), April 7-10, 2011

[Further Publ./Comm.] International Conference Abstracts (possibly Peer-Reviewed)

- L.C. Berselli, F. Guerra, B. Mazzolai and <u>E. Sinibaldi</u>, "Pulsatile viscous flows in elliptical vessels and annuli, with application to blood and cerebrospinal fluid flow". International Winter School on Mathematical Fluid Dynamics, Levico Terme (Italy), December 16-21, 2012
- P. Dario, A. Menciassi, <u>E. Sinibaldi</u> and C. Stefanini, "Biorobotic surgery: towards medical innovation", 23rd Conference of the Society for Medical Innovation and Technology (SMIT 2011), Tel Aviv (Israel), September 13-16, 2011

[Further Publ./Comm.] National Conference (Extended) Abstracts (possibly Peer-Reviewed)

- <u>E. Sinibaldi</u> and B. Mazzolai, "Plant-Inspired Actuation Strategies for Biorobotics". I-RIM 3D 2020: 2nd Italian Conference on Robotics and Intelligent Machines, virtual event, Dec 10-12, 2020
- S. Taccola, F. Greco, <u>E. Sinibaldi</u>, A. Mondini, B. Mazzolai, and V. Mattoli, "Multifunctional electrically controllable/hygromorphic conductive polymer actuators for soft robotics". Materials 2016 Italian National Conference on Materials Science and Technology, Aci Castello (Italy), December 12-16, 2016
- P. Miloro, Z.H. Wang, A. Verbeni, I. Bortone, S. Tognarelli, <u>E. Sinibaldi</u> and A. Menciassi, "A setup for characterization and validation of the therapeutic action of US in thrombolysis". Proceedings of GNB2012 Terzo Congresso Nazionale di Bioingegneria (Third Congress of the Italian National Bioengineering Group), Roma (Italy), June 26-29, 2012
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