

## Curriculum vitae di **Giacomo Moretti**

Sottosettori ERC primari: *PE8\_7 Mechanical and manufacturing engineering*  
Eventuali sottosettori ERC secondario: *PE7\_11 Components and systems for applications*

### PERSONAL DETAILS

Family name, First name: Moretti, Giacomo

Birthdate: 29 March 1989

ORCID ID: [0000-0003-1606-7392](https://orcid.org/0000-0003-1606-7392)

URL for web site: <https://webapps.unitn.it/du/en/Persona/PER0203523/Curriculum>

### • Education and key qualifications

- 12/05/2017 **PhD, Emerging Digital Technologies, cum laude**  
TeCIP Institute, Scuola Superiore Sant'Anna, Pisa, Italy  
Topic: Modelling and design of dielectric elastomer generators for wave energy conversion.
- 2014 **Diploma as “Honors Student” (Allievo Ordinario) in Engineering, cum laude**  
Scuola Superiore Sant'Anna ([superior graduate school](#)), Pisa, Italy
- 2013 **MSc in Energy Engineering, cum laude**  
University of Pisa, Italy

### • Current position

**Associate professor** in Mechanics of Machines.

**Delegate for International Relations** (double degrees, bilateral agreements, mobility programmes)

Department of Industrial Engineering, University of Trento, Italy

### • Previous positions

- 2022 - 2025 **Assistant professor** (3-year tenure track to associate prof.) in Mechanics of Machines,  
Department of Industrial Engineering, University of Trento, Italy
- 2020-2022 **Marie Skłodowska-Curie European research fellow**  
Intelligent Material Systems Laboratory, Saarland University (Germany)  
Supervisor: Prof. [Stefan Seelecke](#)
- 2017-2020 **Visiting researcher**  
Department of Industrial Engineering, University of Trento, Italy
- 2017-2020 **Post-doctoral research fellow** in Mechanics of Machines  
TeCIP Institute, Scuola Superiore Sant'Anna, Pisa, Italy  
Supervisor: Prof. [Massimo Bergamasco](#)
- 2016 **Visiting PhD student**  
Institute for Energy Systems, University of Edinburgh, UK  
Advisor: Dr. [David Forehand](#)
- 2013-2017 **PhD candidate**  
TeCIP Institute, Scuola Superiore Sant'Anna, Pisa, Italy  
Supervisor: Prof. [Marco Fontana](#)
- 2012 **Research intern**  
Fermi National Particles Accelerator Laboratory, Batavia, Illinois, US

### • Bibliometric indices (as of 16/08/2025)

	Publication number	Citations	H-index
<a href="#">Scopus</a>	63	1120	19
<a href="#">Web of Science</a>	58	1154	18
<a href="#">Google Scholar</a>	80	1666	22

## **RESEARCH ACHIEVEMENTS AND PEER RECOGNITION**

### **Research achievements**

Giacomo Moretti's main scientific contributions are in the field of electro-mechanical systems based on electroactive polymers (EAPs), a class of functional materials used in electrostatic transducers (actuators, sensors, energy harvesters).

He has produced pioneer works in applications of smart materials to wave energy harvesting, contributing to make the EAPs - previously a niche technology for small scale applications - a promising research direction in the ocean energy community, as witnessed by new research groups and funding programmes recently emerged on this topic.

He has been among the first scientists to do research on macro-scale applications of fluid-polymer electrostatic transducers – a technology that was previously confined to the scale of micro electro-mechanical systems. His work in this field has brought major publications on relevant scientific venues (Science Robotics, Nature Electronics).

His works on electrostatic machines were recognised with a Marie Curie fellowship (2020-2022) and an ERC starting grant (2025).

Below is a list of selected research achievements (publications, patents), contextualised into 4 key research/activity areas.

#### Wave energy conversion with dielectric elastomer generators

Since the beginning of his PhD (2013), Giacomo Moretti researched on the application of dielectric elastomers (DEs), a class of functional materials that can be used to build electrostatic machines, for ocean wave energy harvesting. He took part in major international projects on this topic, including EU projects [PolyWEC](#) (of which he was among the main technical contributors), [WetFeet](#), and several projects funded by the [Wave Energy Scotland](#) (WES) initiative. He contributed modelling and design tools for DE-based wave energy converters, and carried out extensive experimental activity, including testing of scaled fully-functional prototypes in wave tank facilities (at the University of Edinburgh). With his research, he contributed making DE generators a visible alternative and a strategic topic for the wave energy community, as currently recognised by leading agencies such as [WES](#) and US's [NREL](#).

Some of Giacomo Moretti's PhD work relevant outcomes (as first author and main contributor):

1. [Moretti, G.](#), Papini, G. P. R., Righi, M., Forehand, D., Ingram, D., Vertechy, R., & Fontana, M. (2018). *Resonant wave energy harvester based on dielectric elastomer generator*. Smart Materials and Structures, 27(3), 035015. 10.1088/1361-665X/aaab1e
2. [Moretti, G.](#), Rosati Papini, G. P., Daniele, L., Forehand, D., Ingram, D., Vertechy, R., & Fontana, M. (2019). *Modelling and testing of a wave energy converter based on dielectric elastomer generators*. Proceedings of the Royal Society A, 475(2222), 20180566. doi.org/10.1098/rspa.2018.0566
3. [Moretti, G.](#), Herran, M. S., Forehand, D., Alves, M., Jeffrey, H., Vertechy, R., & Fontana, M. (2020). *Advances in the development of dielectric elastomer generators for wave energy conversion*. Renewable and Sustainable Energy Reviews, 117, 109430. 10.1016/j.rser.2019.109430
4. Moretti contributed establishing [Cheros Srl](#), spin out company of Scuola Sant'Anna (Pisa), whose mission is to promote technology transfer of research on multifunctional drives. He has been PI/co-PI (for Cheros) of 3 WES [projects](#) on the topic of DE generators control and [direct-drive distributed converters](#).

#### Fluid-gap electrostatic transducers

Giacomo Moretti was among the first scientists to do research on a new class of electrostatic machines, called dielectric fluid transducers (often referred to also as HASEL, or zipping electrostatic actuators). Among other, he contributed devising and demonstrating an electrostatic actuator concept, presented on *Science Robotics* (of which he was one of the main contributors). He contributed providing the idea and developing the analytical formulation behind a methodological work that elucidates the dynamics underlying the phenomenon of charge accumulation in dielectric fluid transducers, published on *Nature Electronics*. Based on these results, in 2024 he was awarded an [ERC starting grant project](#) to advance his research on fluid-gap transducers.

5. [Sirbu, I. D.](#), [Moretti, G.](#), Bortolotti, G., Bolignari, M., Dirè, S., Fambri, L., ... & Fontana, M. (2021). *Electrostatic bellow muscle actuators and energy harvesters that stack up*. Science Robotics, 6(51), eaaz5796. 10.1126/scirobotics.aaz5796

- Sirbu, I. D., Preninger, D., Danninger, D., Penker, L., Schwödianer, R., [Moretti, G.](#), Arnold, N., Fontana, M., Kaltenbrunner, M. (2023) *Electrostatic actuators with constant force at low power loss using matched dielectrics*. Nature Electronics, 6(11). 10.1038/s41928-023-01057-0

#### Coil-free loudspeakers made of dielectric elastomers

Giacomo Moretti was the recipient of a [Marie-Curie European fellowship](#) at Saarland University (DE), through which he investigated electrostatic dielectric elastomer (DE)-based loudspeakers. He carried out analytical and experimental analyses to characterise high-frequency voltage-driven vibrations in DE membranes. Based on those results, he conceived a new principle to embed multiple actuation functions (linear actuation, sound generation) within a same DE actuator, driven by a single electrical input, which resulted in first a paper (as senior author) on *Advanced Functional Materials*, with several follow-up works, and a patent (first author).

- [Moretti, G.](#), Rizzello, G., Fontana, M., & Seelecke, S. (2022). *High-frequency voltage-driven vibrations in dielectric elastomer membranes*. Mechanical Systems and Signal Processing, 168, 108677. doi.org/10.1016/j.ymssp.2021.108677
- Gratz-Kelly, S., Rizzello, G., Fontana, M., Seelecke, S., & [Moretti, G.](#) (2022). *A Multi-Mode, Multi-Frequency Dielectric Elastomer Actuator*. Advanced Functional Materials, 32(34), 2201889. doi.org/10.1002/adfm.202201889
- [Moretti, G.](#), Gratz-Kelly, S., Fontana, M., Motzki, P., Rizzello, G. and Seelecke, S., Mateligent GmbH, 2023. *Audio-tactile transducer device based on dielectric electro-active elastomers*. EP4228286A1; US2023262396A1
- Gratz-Kelly, S., Krüger, T. F., Seelecke, S., Rizzello, G., & [Moretti, G.](#) (2024). *A tri-modal dielectric elastomer actuator integrating linear actuation, sound generation, and self-sensing capabilities*. Sensors and Actuators A: Physical, 372, 115332. 10.1016/j.sna.2024.115332

#### **Awards and peer recognition**

##### Prizes and awards

- Selected (among all young STEM researchers at Saarland University) as the 2020 recipient of a research grant issued by a private foundation (MINT Forschungpreis by the [MESaar foundation](#)) to hire student assistants and build experimental testbenches.
- First place winner at **EAP-in-action demonstration award**, SPIE Smart Structures + Nondestructive evaluation Conference, 22-26 March 2021, with the demo "["Electrostatic Bellow Muscle \(EBM\): flexible multipurpose electrostatic actuator and energy harvester based on fluid dielectric"](#)"
- ASME Adaptive Structures & Material Systems **Best Paper Award** in Structural Dynamics & Control, for the paper *Electrostatic bellow muscle actuators and energy harvesters that stack up*, Science Robotics 6(51), 2021.
- **Trusted reviewer certificate** from IOP Publishing, "in recognition of an exceptionally high level of peer review competency", 2022.
- **Best Contribution Award** at Workshop on Artificial Intelligence and Smart Material Systems of the Department of Excellence on Robotics & AI of Scuola Superiore Sant'Anna, Pisa (IT), 2022.
- Member of the **EBB:Flow team**, one of the winners of the [InDeep challenge](#) - innovative distributed wave energy prize (phase 2), organised by the US Department of Energy. Team, consisting of academics and members of various companies (Novus, 4C Engineering), 2024.

##### Invited presentations

- Tenth Forum on New Materials ([CIMTEC2026](#)), Perugia, Italy, exp: 23 June 2026.  
Talk (provisional): *Electrostatic machines based on multifunctional materials: from dielectric membrane actuators to fluid gap electroactive polymer transducers*
- Thirteenth international Conference on Soft Transducers and Electromechanically Active Polymers ([EuroEAP2025](#)), Linz, Austria (chair: prof. Ingrid Graz), exp: 10/06/2025  
Talk: *Leveraging electro-mechanical dynamics to improve the performance of EAP devices*
- [SPIE Smarts Structures NDE 2025](#) conference, workshop "Electroactive Polymer Actuators, Sensors, and Devices (EAPAD)", Vancouver (CA) - keynote speaker. exp: 18/03/2025.  
Talk: *From dielectric elastomers to zipping transducers. Challenging the limits of EAP devices*
- Workshop [Elastomers in Power Generation](#) (chair: prof. J. Busfield), 17/03/2023, IOM3 Conference Series, The Institute of Materials, Minerals & Mining, London, UK.  
Talk: *Converting Wave Energy with Dielectric Elastomers: issues, results and perspectives*

- Workshop *Electroactive Polymers for Soft Transducers* (chairs: profs. M. Kaltenbrunner and C. Keplinger), 19th Annual International Symposium on Electrets ([ISE19](#)), Linz, Austria, 22/09/2023.  
Talk: *An overview on the design and development of dielectric elastomer transducers for dynamic applications*

#### Fellowships

- Junior member of [ITATEC](#), the Italian Academy of Engineering
- Guest lecturer with a **scholarship** issued by the [REMplus programme](#), MSc in Renewable Energy in the Marine Environment, Norwegian University of Science and Technology (NO), A.Y. 2023-24 and 2024-25.  
Topic: *Electroactive polymer generators: overview and perspectives for wave energy applications*
- **Mercator fellow** at the University of Saarland, within project ‘S3DEG - *The next generation of bi-Stable, Smart, and Self-sensing Dielectric Elastomer Generators*’ (PI: Dr. [Gianluca Rizzello](#)), funded by the [Deutsche Forschungsgemeinschaft](#) (DFG), 2024-now.

### ADDITIONAL INFORMATION

#### **Research projects**

##### Lead

- [fiEAP](#), **ERC starting grant** 2024, Jan. 2025 – Dec. 2029. Role: PI. Value: 1.5 M€
- **Concept validation of a pressure sensor for automotive applications**, industrial collaboration between [Roehling Automotive](#) and DII at UNITN. 2023-ongoing. Role: Scientific responsible. Value: 19.5 k€
- [DEtune](#), H2020 Marie Skłodowska-Curie Individual European Fellowship, Nov. 2020 - Aug 2022. Role: beneficiary and proponent. Value: 163k€
- **Wave Energy Scotland – Direct generation competition**, 2 projects, led by [WaveX](#) and [4cEngineering](#) (UK) respect., Nov. 2023 - ongoing. Role: Responsible for Cheros Srl. Value: 41 k€ (Cheros’ budget)

##### Participation (selection)

- [Department of Excellence programme](#) (grant issued by the Italian Ministry of Education to outstanding university departments), recipient: DII at UNITN, 2023-2027. Role: **Area leader** and spokesperson for the area [Soft Robotics](#). Value: 7.1 M€
- [WetFeet](#), H2020 EU project, Jun. 2015 - Jun. 2018, Role: technical contributor, modelling and testing of DE generators for wave energy conversion
- [Wave Energy Scotland](#) - PTO programme, Direct Contact Dielectric Elastomer Generator, Nov. 2015 - Jan. 2018 (2 projects). Role: technical contributor, modelling and wave tank testing of DE wave energy converters.
- [PolyWEC](#), FET-7 EU project, Feb. 2013 - Jan. 2017 Role: responsible and main contributor for modelling tasks

#### **Editorial/refereeing roles**

- **Technical editor** for IEEE/ASME [Transactions on Mechatronics](#), 2025-now.
- **Co-organiser** of a [workshop](#) on *Soft Robotic Actuation and Sensing Based on Functional Materials* at [IEEE RoboSoft 2025 conference](#), Lausanne.
- **Co-organiser** of the annual conference of the [GE4 network](#) (as Delegate for International Relations of the Dept. of Industrial Eng., Trento), Trento, 2024.
- **Co-organiser** of a symposium on *Recent advances in mechatronic systems* at [I-RIM 3D](#) conference, Rome, 2022 and 2023.
- **Co-organiser** of the minisymposium *Modeling and Control of Smart Material Systems and Structures*, IFAC [Mathmod Conference 2022](#), Vienna
- **Reviewer Editor** for [Frontiers in Robotics and AI](#) (topic: Soft Robotics).
- Member of the **evaluation panel** for the Best Student Paper and Best Student Hardware Competition, [ASME SMASIS](#) 2021 Conference (President: prof. Giovanni Berselli).
- **Referee** for several leading journals in the fields of Mechatronics, Robotics, and Energy, e.g.: Smart Mater Struct; IEEE T Mech.; IEEE RAL.; IEEE T Contr Syst T.; Ocean Eng; Sensor Actuat A-Phys; Sci Rep-UK.

### Project proposal refereeing

- Referee for 3 project proposals for the internal collaborative call of the [T.I.M.E](#) Association, 2025.
- Referee for a project proposal for the [CY Initiative – CY Generations](#) call, 2024 (French Government)
- Referee for a project proposal for the [FESR21-27](#) programme (Südtirol, IT).

### Patents

- [1] **Moretti G.**, Gratz-Kelly S., Fontana M., Motzki P., Rizzello G., Seelecke S. *Audio-tactile Transducer Device based on Dielectric Electroactive elastomers*. US2023262396A1. 2022.
- [2] Cherubini A., **Moretti G.**, Fontana M. *Aircraft System with High-Altitude Wind Capture for Wind Generator*. WO2019053755 (A1). 2017
- [3] Fontana M., Daniele L., **Moretti G.**, Damiani F., Righi M., Vertechy R., Teillant B., Vicente M., Sarmiento A., Forehand D., Ingram D. *Wave Motion Generator Based on a Dielectric Elastomer with Stiffness Compensation*. WO2018116276 (A1). 2016

### PhD students supervision

- Currently **main supervisor** of 2 PhD students, 1 postdoctoral researcher and 1 graduate student, and **co-supervisor** of 4 PhD students at the University of Trento
- Currently **co-supervising** 1 PhD student at Saarland University.

### PhD committee member

- Member of the teaching board of the following **doctoral programmes**:
  - o PhD in ‘Materials, Mechatronics and Systems Engineering’ (MMSE), Department of Industrial Engineering Industrial Engineering, University of Trento
  - o PhD in ‘Industrial Innovation’, interdepartmental programme (University of Trento).
- **Referee** for 6 PhD theses at the Universities of Padua, Bologna, Edinburgh (UK), Polytechnic of Bari, and TU Berlin (DE), 2020-now.

### Selected publications

- [1] Gratz-Kelly S., Krüger T. F., Seelecke S., Rizzello G., & **Moretti G.** (2024). *A tri-modal dielectric elastomer actuator integrating linear actuation, sound generation, and self-sensing capabilities*. *Sensors and Actuators A: Physical*, 372, 115332. [IF: 4.1](#)
- [2] Sîrbu I. D., Preninger D., Danninger D., Penker L., Schwödiauer R., **Moretti G.**, Arnold, N., Fontana, M., Kaltenbrunner, M. (2023) *Electrostatic actuators with constant force at low power loss using matched dielectrics*. *Nature Electronics*. 6(11). [IF: 34.5](#)
- [3] Gratz-Kelly S., Rizzello G., Fontana M., Seelecke S., **Moretti G.** (2022). *A Multi-Mode, Multi-Frequency Dielectric Elastomer Actuator*. *Advanced Functional Materials*, 32(34). [IF: 18.5](#)
- [4] **Moretti G.**, Rizzello G., Fontana M., Seelecke S. (2022). *High-frequency voltage-driven vibrations in dielectric elastomer membranes*. *Mechanical Systems and Signal Processing*, 168, 108677. [IF: 7.9](#)
- [5] Righi M., **Moretti G.**, Forehand D., Agostini L., Vertechy R., Fontana M. (2021). *A broadbanded pressure differential wave energy converter based on dielectric elastomer generators*. *Nonlinear Dynamics*, 105, 2681-2876. [IF: 5.2](#)
- [6] Sîrbu I. D., **Moretti G.**, Bortolotti G., Bolignari M., Diré S., Fambri L., Vertechy R., Fontana M. (2021) *Electrostatic bellow muscle actuators and energy harvesters that stack up*. *Science Robotics*, 6(51). [IF: 26.1](#)
- [7] **Moretti G.**, Santos-Herran M., Forehand D., Alves M., Jeffrey H., Vertechy R., Fontana M. (2020) *Advances in the development of dielectric elastomer generators for wave energy conversion*. *Renewable and Sustainable Energy Reviews*, 117, 109430. [IF: 16.3](#)
- [8] **Moretti G.**, Malara G., Scialò A., Daniele L., Fiamma V., Romolo A., Vertechy R., Fontana M., Arena, F. (2020). *Modelling and field testing of a U-OWC wave energy converter with dielectric elastomer generator*. *Renewable Energy*, 146, 628-642. [IF: 9.0](#)
- [9] Rosati Papini G.P. , **Moretti G.**, Vertechy R. , Fontana M. (2018) *Control of an oscillating water column wave energy converter based on dielectric elastomer generator*, *Nonlinear Dynamics*, 92(2), 181-202. [IF: 5.2](#)
- [10] Cherubini A., **Moretti G.**, Fontana M. (2018) *Dynamic Modeling of Offshore Airborne Wind Energy Converters*, In *Airborne Wind Energy* pp. 137-163 (book chapter) Springer, Singapore.