

ANTONIO E. FORTE

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CAREER PATH

King's College London, UK

August 2021 - Present

Senior Lecturer in Engineering — *Robotic Materials, Mechanical Logic, Emergent Behaviours in Metamaterials*

Head of RADlab — *Reconfigurable and Adaptive Designs Lab.*

Current PhD students: M. Mousa, A. Rezanejad, B. Barakat, Y. Wang, M. Rasouli, M. Adlerstein.

Postdocs: J. Yao — Two additional postdocs will be hired next year.

Harvard University, USA

October 2018 - August 2021

Marie Curie Postdoctoral Fellow at the John A. Paulson School of Engineering and Applied Sciences —

Mechanical Metamaterials, Soft Systems, Inverse Design & Optimisation. Advisor: [Prof Katia Bertoldi](#).

Imperial College London, UK

January 2016 - September 2018

Postdoc in Bioengineering — *Signal Processing & Machine Learning.* Advisor: [Prof Tobias Reichenbach](#).

Imperial College London, UK

October 2011 - December 2015

PhD in Mechanical Engineering — *Materials Design, Biomechanics, Finite Element Modelling.*

Advisor: [Prof Daniele Dini](#).

AWARDS AND GRANTS

2024 – *EPSRC Impact Accelerator Award* — Entangled Granular Metamaterials (PI)

2024 – *KCL Commercial Development Fund* — TangleHold Gripping Technology (Co-I)

2023 – *UKRI Future Leaders Fellowship* - Started in June 2024 (duration 4yrs + 3yrs renewal)

NARMM: Neural-driven, Active and Reconfigurable Mechanical Metamaterials (PI)

2023 – *EPSRC Impact Accelerator Award* — Helix EXtrusion GRIPper: HEXGRIP (PI)

2022 – *MRC Impact acceleration fund* — Wearable system for the early detection of heart valve diseases (Co-I)

2018 – *EU Marie Curie Individual Fellowship (GLOBAL)* at Harvard University (PI)

Other: NMES Faculty Enterprise & Engagement Award, Departmental Recognition Award, NMES Faculty Teaching Award, King's Artists Residency Award, FHEA, various travel grants & outstanding student awards.

TEACHING EXPERIENCE

Module Lead – King's College London, UK (2022/23/24, Spring term)

- Designed, taught and marked the Finite Element Analysis module (6CCE3FEA, ~80 students)

Module Lead – King's College London, UK (2021/22/23, Autumn term)

- Designed, taught and marked the Design:Empowerment module (5CCE2EMP, ~240 students)

Group Project Supervisor for MSc Robotics – King's College London, UK (2023/24, all-year)

- Leading MSc students on building and testing of wearable robotic metamaterials (7CCEMRGP)

Supporting Lecturer – King's College London, UK (2021-24, Autumn term)

- Designed, taught and marked the tutorials for the Materials module (5CCE2MAT, ~80 students)
- Designed and taught CAD tutorials for the Design:KEP module (4CCE1KEP, ~240 students)
- Supervisor, guided groups of students in their RC boat designs (4CCE1MCP, ~240 students)
- Marker for Mechanics module (4CCE1MEC, ~200 students)

Teaching Assistant – Imperial College, UK (2017, Autumn term)

- Taught (with Prof Reichenbach) the Statistics and Data Analysis module (BE9-MSTDA, ~80 students)

Teaching Assistant – Imperial College, UK (September 2011 – December 2015)

- Taught (with Prof Dini) and marked the Stress Analysis module (ME1-HSAN, ~100 students, 2 terms)
- Supported laboratory sessions for Materials module (ME1-HMATL, 1 term)

Student Mentoring and Supervision

- King's College London, UK (August 2021 – Present)
 - 1st supervisor, PhDs: M. Mousa, A. Rezanejad, B. Barakat, Y. Wang, M. Rasouli, M. Adlerstein
 - 2nd supervisor, PhDs: Y. Lu, K. Arcovio, M. Li
 - Supervisor of 4 UG Research Fellows: L. Jaber, N. Hashmi, Y. Sohn, A. Zenagui
 - Supervisor for 12 UG, 8 MSc Individual Projects, 2 MSc Group Projects (~10 students)
- Harvard University, US (October 2018 – August 2021)
 - Co-supervised 5 PhDs, 2 UG and 4 MSc visiting students
- Imperial College, UK (September 2011 – October 2018)
 - Co-supervised 5 PhDs, 3 UG and 5 MSc students

PROFESSIONAL AND ADMINISTRATIVE ROLES

• Scientific Peer Review

Advanced Functional Materials — Advanced Engineering Materials — Biomechanics and Modeling in Mechanobiology — Annals of Biomedical Engineering — JMBBM — Biomedical Physics and Engineering Express (BPEX) — International Journal of Solids and Structures — Materials Science & Engineering C — Materials & Design — Progress in Additive Manufacturing — Journal of Biomechanics — Materialia — IEEE Access — IRBM — Journal of Physics D: Applied Physics — Acta Materialia — Soft Matter...

• Service Roles for funding bodies, scientific meetings and outreach

- Reviewer for EPSRC, Springboard Awards, the Leverhulme Trust, and the European Commission
- Organizer & Chair of the "*Functionality via nonlinearities*" session at APS Global Physics Summit
- Organiser of the *Creative Differences Workshop*, in collaboration with the London Biennale
- Member of the UKMMN, APS, IEEE, RAS, Automorph Network...
- Testimonial for British Science Week, Pint of Science, European Researcher Night, MEETmeTONIGHT...

• KCL Service Roles

- Coordinator for the 2nd year UG Engineering Curriculum, NMES Systems Development Sub-Committee
- Recruitment panels for PDRAs and Academic positions, PhD Upgrade Examiner (panel chair)
- Led procurement of Departmental equipment and creation of Virtual Machine Framework

INVITED TALKS (LAST 5 YEARS)

KU Leuven (Soft Robotics PhD Conference, 11/24) — Harvard University (Applied Mechanics Seminar, 10/24) — Nile University (NILES2024 – IEEE, 10/24 (keynote speaker) — Imperial College London (Hamlyn Symposium, 06/24) — AMOLF (workshop, 05/24) — Imperial OncoEng Conference 01/24 (keynote speaker) — Oxford University (5th UK Robot Manipulation Workshop, 01/24) — Oxford University (Solid Mechanics and Materials Engineering Seminar, 11/23) — UCL (Lighten workshop, 10/23) — University of Bath (Shape Morphing Metamaterials Workshop, UKMMN, 09/23) — Somerset House (Automorph Workshop, 06/23) — University of Maryland (Tubaldi group, 01/23) — University of Bristol (Softlab Seminar Series, 06/22) — UCL (Lighten workshop, 05/22) — SIAMM21, 02/21 (keynote speaker) — UCL (Dept of Mech Eng, 01/21) — Warwick University (Dept of Mech Eng, 10/20) — MSE2020, 09/2020 (keynote speaker) — London South Bank University (Dept of Mech Eng, 07/20) — EMI2020 (Columbia University, 05/20 - cancelled due to COVID) — Boston University (Dept of Mech Eng Seminar, 03/20) — Imperial College London (Bioengineering Dept, 02/20) — Boston University (Moss Lab Seminar Series, 01/20)

PUBLICATIONS

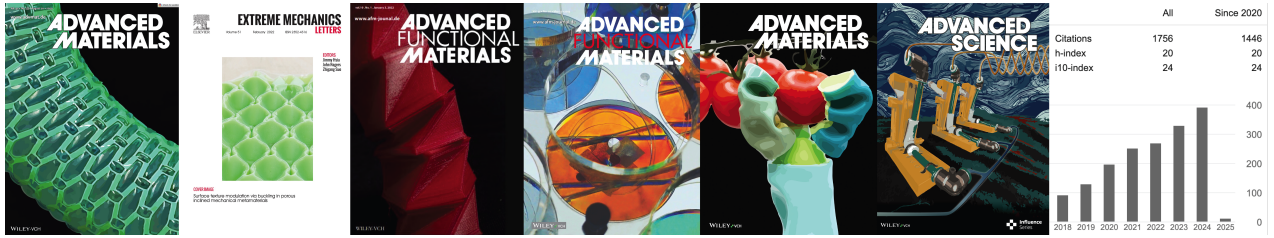


Figure 1: Awarded journal covers and Google Scholar metrics (01/2025)

(#Corresponding Author; †Joint First Authorship; Last Author; [*]Highlighted publications)

- [*] M. Mousa, A. Rezanejad, B. Gorissen, **A. E. Forte**# (2024). Frequency-Controlled Fluidic Oscillators for Soft Robots. *Advanced Science* (Here we presented electronic-free fluidic circuits that can self-oscillate, be reconfigured on-the-fly, and control a range of robotic devices. The paper was awarded the frontispiece of the journal for “Outstanding Results”).
- Y. Yang, H. Read, M. Sbai, A. Zareei, **A. E. Forte**, D. Melancon, K. Bertoldi (2024). Complex Deformation in Soft Cylindrical Structures via Programmable Sequential Instabilities. *Advanced Materials* (The paper was awarded the frontispiece of the journal for “Outstanding Results”).
- A. Rezanejad, M. Mousa, M. Howard, **A. E. Forte** # (2024). Complex picking via entanglement of granular mechanical metamaterials. *arXiv*.
- S. A. Pope, ..., M. Mousa, A. Rezanejad, **A. E. Forte**, ... E. Galiffi (2024). The 2024 Active Metamaterials Roadmap. The IOP agreed to publish this in *Journal of Physics D*.
- [*] **A. E. Forte**#†, D Melancon†, M Zanati, M De Giorgi, K Bertoldi# (2023). Chiral Mechanical Metamaterials for Tunable Optical Transmittance. *Advanced Functional Materials* (Here we introduced chiral mechanical metamaterials to manipulate light via optimisation strategies — awarded journal cover).
- D. Melancon†, **A. E. Forte**†, L. M. Kamp, B. Gorissen, K. Bertoldi(2022). Inflatable Origami: Multimodal Deformation via Multistability. *Advanced Functional Materials* (awarded journal cover).
- M. C Fernandes, S. Mhatre, **A. E. Forte**, ... & K. Bertoldi (2022). Surface texture modulation via buckling in porous inclined mechanical metamaterials. *Extreme Mechanics Letters* (awarded cover).
- [*] **A. E. Forte**#, ... & K. Bertoldi# (2022). Inverse Design of Inflatable Soft Membranes Through Machine Learning. *Advanced Functional Materials* (This work is the first of its kind as it used Neural Networks to solve an ill-posed inverse problem in soft inflatable membranes, allowing a novel design strategy for the targeting of deformable shapes upon inflation — featured on the Harvard Spotlight.)
- A. Mazier, A. Bilger, **A. E. Forte**, ...& S. P. A. Bordas (2022). Inverse deformation analysis: an experimental and numerical assessment using the FEniCS Project. *Engineering with Computers*.
- B. Deng, M. Zanati, **A. E. Forte**, K. Bertoldi (2022). Topological solitons make metamaterials crawl. *Physical Review Applied*.
- L. Jin, **A. E. Forte** & K. Bertoldi (2021). Mechanical Valves for On-Board Flow Control of Inflatable Robots. *Advanced Science*.
- M. Terzano, A. Spagnoli, D. Dini, **A. E. Forte** (2021). Fluid–solid interaction in the rate-dependent failure of brain tissue and biomimicking gels. *Journal of the Mechanical Behavior of Biomedical Materials*.
- A. Dine, E. Bentley, L. A. Poulmarck, D. Dini, **A. E. Forte**#, Z. Tan# (2021). A dual nozzle 3D printing system for super soft composite hydrogels. *HardwareX*.
- B. Deng†, S. Yu†, **A. E. Forte**, V. Tournat, K. Bertoldi (2020). Characterization, stability and application of domain walls in flexible mechanical metamaterials. *PNAS*.
- [*] L. Jin†, **A. E. Forte**†, ... & K. Bertoldi (2020). Kirigami-inspired inflatables with programmable shapes. *Advanced Materials* (Here we designed materials that can control and mould a balloon into pre-programmed shapes. The system uses kirigami sheets — thin sheets of material with periodic cuts — embedded into an inflatable device. This provided a new platform for shape-morphing devices that supports the design of innovative medical tools, actuators and structures— awarded journal cover).

16. Z. Tan, J. P. Ewen, **A. E. Forte**, S. Galvan, E. De Momi, F. Rodriguez y Baena, D. Dini (2020). What does a brain feel like?. *Journal of Chemical Education*.
17. M. Saiz-Alia, **A. E. Forte** & T. Reichenbach (2019). Individual differences in the attentional modulation of the human auditory brainstem response to speech inform on speech-in-noise deficits. *Scientific Reports*.
18. G. Carpenter, ... **A. E. Forte**, ... & S. K. Baier (2019). A study of saliva lubrication using a compliant oral mimic. *Food Hydrocolloids*.
19. G. Binkhamis, **A. E. Forte**, ... & K. Kluk-De Kort (2019). Speech auditory brainstem responses in adult hearing aid users: Effects of aiding and background noise, and prediction of behavioral measures. *Trends in Hearing*.
20. O. Etard, ... **A. E. Forte** & T. Reichenbach (2019). Decoding of selective attention to continuous speech from the human auditory brainstem response. *Neuroimage*.
21. Z. Tan, ... & **A. E. Forte** (2018). Composite hydrogel: A high fidelity soft tissue mimic for surgery. *Materials & Design*.
22. [*] Z. Tan, ... & **A. E. Forte** (2017). Cryogenic 3d printing of super soft hydrogels. *Scientific Reports* (Here we presented a novel 3D printing method that produces stable structures by utilizing the liquid to solid phase change of a hydrogel ink, using carbon dioxide (CO₂) in isopropanol bath. The setup could successfully create 3D structures, with mechanical properties comparable with those of human tissues. This work gave birth to a successful UK start up — Organa Technology).
23. **A. E. Forte**, O. Etard & T. Reichenbach (2017). The human auditory brainstem response to running speech reveals a subcortical mechanism for selective attention. *eLife*.
24. **A. E. Forte**, S. Gentleman & D. Dini (2017). On the characterization of the heterogeneous mechanical response of human brain tissue. *Biomechanics and Modeling in Mechanobiology*.
25. **A. E. Forte**, S. Galvan & D. Dini (2017). Models and tissue mimics for brain shift simulations. *Biomechanics and Modeling in Mechanobiology*.
26. **A. E. Forte**, ... & D. Dini (2016). A composite hydrogel for brain tissue phantoms. *Materials & Design*.
27. A. Leibinger, **A. E. Forte**, ... & F. Rodriguez Y Baena (2016) Soft tissue phantoms for realistic needle insertion: a comparative study. *Annals of Biomedical Engineering*.
28. **A. E. Forte**, ... & J.G. Williams (2015). Modelling and experimental characterisation of the rate dependent fracture properties of gelatine gels. *Food Hydrocolloids*.
29. Das Neves Borges, **A. E. Forte**, ... & M. Marenzana (2014). Rapid, automated imaging of mouse articular cartilage by microCT for early detection of osteoarthritis and finite element modelling of joint mechanics. *Osteoarthritis and cartilage*.

PATENTS

1. Arcovio K., Yu Y., Rezanejad A., Mousa M., Alhnan M. A., Al-Jamal K., **Forte A. E.** ORAL DELIVERY OF BIOLOGICS – STENTS DEVICES (being finalised for filing), King’s College London, UK Patent Application (with 4 of my PhD students, 2 of which I first supervise).
2. Sun X., Al-Jamal K., Alhnan M. A., **Forte A. E.** ORAL DELIVERY OF BIOLOGICS – HYDROGEL (**P605922GB**), King’s College London, UK Patent Application (successfully filed, with collaborators from the KCL Pharmaceutical Department).
3. Rezanejad A., Mousa M., Howard M., **Forte A. E.** A means to use tangling granular metamaterial to grip and manipulate materials and objects (**P44468GB**), King’s College London, UK Patent Application (successfully filed, with 2 of my PhD students — PCT filed on 07/01/2025).

OTHER CONTRIBUTIONS

~30 contributions, including national/international conference papers (some of these are peer-reviewed), abstracts, posters, and codes, are hereby omitted.