

Curriculum Vitae

Personal Information

Name Benigno Marco FANNI
Date of Birth

Education

- Jan 2019 – present **University of Pisa** *Pisa, Italy*
PhD student at Department of Information Engineering
Supervisors: Prof. Nicola Vanello – nicola.vanello@iet.unipi.it, Prof. Luigi Landini – luigi.landini@unipi.it, Prof. Simona Celi – s.celi@ftgm.it
- Sept 2014 – Apr 2017 **University of Pisa** *Pisa, Italy*
Master of Science in Biomedical Engineering (109/110)
- Sep 2011 – Sept 2014 **University of Pisa** *Pisa, Italy*
Bachelor of Science in Biomedical Engineering (107/110)

Current Position

- Jan 2018 – Present **Fondazione Toscana Gabriele Monasterio** *Massa, MS, Italy* – Affiliated researcher
- Numerical simulation of patient-specific hemodynamics and cardiovascular procedures
 - Design of mock loop circuits for fluid dynamics experiments
 - Biomedical images elaboration
 - Additive manufacturing for biomedical applications

Current Projects (Role)

- o **IMeC - In vivo Mechanical Characterization** (Principal Investigator)
 - Development of an image-based framework for patient-specific material characterization
 - Segmentation of structural and functional biomedical images
 - 3D printing manufacturing of large vessels models
 - Development of fluid dynamic setups for fluid dynamics evaluation of large vessels

Work Experience

- Oct 2016 – Dec 2016 **Great Ormond Street Hospital** *30, Guilford St, WC1N 1EH London, United Kingdom* – Honorary Contract for visitor student in the Institute of Cardiovascular Science (University College of London).
- Development of a sensorized in-vitro workbench for MR-compatible mock loop experiments
 - Finite element cardiovascular simulations

Awards

- Best Poster Presentation VIII Annual Meeting of the Italian Chapter of European Society of Biomechanics, September 30 – October 1, 2019, Bologna, Italy
- Travel Grant Award European Society of Cardiology Conference, August 25 - 29, 2018, Munich, Germany
- Best Poster Presentation European Society of Cardiology Conference, August 25 - 29, 2018, Munich, Germany

Selection of Publications

International Journals

- [J1] Fanni, B. M., Gasparotti, E., Vignali, E., Capelli, C., Positano, V. and Celi, S. An integrated in-vitro and in-silico workflow to study the pulmonary bifurcation hemodynamics. *Unver review*.
- [J2] Antonuccio, M. N., Mariotti, A., Fanni, B. M., Capellini, K., Capelli, C., Sauvage, E. and Celi, S. (2021, August). Effects of uncertainty of outlet boundary conditions in a patient-specific case of aortic coarctation. *Annals of Biomedical Engineering*. (Vol. 49, pp. 3494-3507). Springer.
- [J3] Celi, S., Gasparotti, E., Capellini, K., Vignali, E., Fanni, B. M., Ait-Ali, L., Cantinotti, M., Murzi, M., Berti, S. and Positano, V. (2021, June). 3D printing in modern cardiology. *Current Pharmaceutical Design*. (Vol. 27, pp. 1918-1930). Bentham Science.
- [J4] Capellini, K., Gasparotti, E., Cella, U., Costa, E., Fanni, B. M., Groth, C., Porziani, S., Biancolini, M. E. and Celi, S. (2021, May). A novel formulation for the study of the ascending aortic fluid dynamics with in vivo data. *Medical Engineering and Physics*. (Vol. 91, pp. 68-78). Elsevier.
- [J5] Fanni, B. M., Sauvage, E., Celi, S., Norman, W., Vignali, E., Landini, L., Schievano, S., Positano, V. and Capelli, C. (2020, August). A proof of concept of a non-invasive image-based material characterization method for enhanced patient-specific computational modeling. *Cardiovascular Engineering and Technology*. (Vol. 11, pp. 532-543). Springer.
- [J6] Zaccaria, A., Danielli, F., Gasparotti, E., Fanni, B. M., Celi, S., Pennati, G. and Petrini, L. (2020, August). Left atrial appendage occlusion device: Development and validation of a finite element model. *Medical Engineering and Physics*. (Vol. 82, 104-118). Elsevier.
- [J7] Vignali, E., Gasparotti, E., Capellini, K., Fanni, B. M., Landini, L., Positano, V., and Celi, S. (2020, July). Modeling biomechanical interaction between soft tissue and soft robotic instruments: importance of constitutive anisotropic hyperelastic formulations. *International Journal of Robotics Research*. (Vol. 40, pp. 224-235). Sage Journals.
- [J8] Fanni, B. M., Capellini, K., Di Leonardo, M., Clemente, A., Cerone, E., Berti, S. and Celi, S. (2020, February). Correlation between LAA morphological features and computational fluid dynamics analysis for non-valvular atrial fibrillation patients. *Applied Sciences*. (Vol. 10, 1448). MDPI.
- [J9] Gasparotti, E., Vignali, E., Losi, P., Scatto, M., Fanni, B. M., Soldani, G., Landini, L., Positano, V. and Celi, S. (2018, December). A 3D printed melt-compounded antibiotic loaded thermoplastic polyurethane heart valve ring design: an integrated framework of experimental material tests and numerical simulations. *International Journal of Polymeric Materials and Polymeric Biomaterials*. (Vol. 68, pp. 1-10). Taylor & Francis.

International and National Conferences/Workshops with Peer Review

- [I1] Fanni, B. M., Antonuccio, M. N., Santoro, G. and Celi, S. (2022, July). An indirect and non-invasive methodology to assess patient-specific elastic properties of great vessels from magnetic resonance imaging. *9th World Congress of Biomechanics*.
- [I2] Fanni, B. M., Capellini, K., Benvenuti, A., Berti, S. and Celi, S. (2022, July). Effects of pulmonary veins on the hemodynamics of the left atrial appendage: a computational fluid dynamics investigation. *9th World Congress of Biomechanics*.
- [I3] Fanni, B. M., Sauvage, E., Schievano, S., Positano, V., Capelli and Celi, S. (2021, July). A parametric equation for the non-invasive estimation of the elastic properties of materials. *26th Congress of the European Society of Biomechanics*.
- [I4] Fanni, B. M., Gasparotti, E., Vignali, E., Capelli, C., Positano, V. and Celi, S. (2021, July). An MRI-based patient-specific RCR estimation of pulmonary bifurcation using in-vitro and in-silico approaches. *26th Congress of the European Society of Biomechanics*.

- [I5] Antonuccio, M. N., Perondi, S., Fanni, B. M., Capellini, K. and Celi, S. (2021, July). CFD/UQ integrated approach for patient-specific studies of aortic coarctation. *26th Congress of the European Society of Biomechanics*.
- [I6] Fanni, B. M., Vignali, E., Capelli, C., Positano, V. and Celi, S. (2021, May). An integrated in-vitro and in-silico workflow to study the pulmonary bifurcation hemodynamics. *32nd Parallel Computational Fluid Dynamics Conference*.
- [I7] Vignali, E., Gasparotti, E., Fanni, B. M., Ait-Ali, L., Positano, V., Landini, L. and Celi, S. (2020, March). Development of a fully controllable real-time pump to reproduce left ventricle physiological flow. *Proceedings of XXIV AIMETA Conference 2019. Lecture Notes in Mechanical Engineering*. (pp. 908-919). Springer.
- [I8] Vignali, E., Gasparotti, E., Mariotti, A., Capellini, K., Haxhiademi, D., Bianchi, G., Fanni, B. M., Positano, V., Landini, L., Salvetti, M. V. and Celi, S. (2019, October). Development of a custom mock circulatory loop for in-vitro study of patient specific aortic branches. *International Society for Mechanical Circulatory Support*.
- [I9] Fanni, B. M., Capellini, K., Gasparotti, E., Vignali, E., Positano, V., Landini, Cerone, E., Berti, S. and Celi, S. (2019, October). L'in-silico e l'in-vitro per il planning clinico della procedura di chiusura percutanea dell'auricola sinistra. *Italian Digital Biomanufacturing Network 3rd National Congress*.
- [I10] Gasparotti, E., Vignali, E., Capellini, K., Haxhiademi, D., Bianchi, G., Fanni, B. M., Landini, L., Positano, V. and Celi, S. (2019, October). Sviluppo di un banco prova paziente specifico per lo studio in-vitro della fluidodinamica dell'arco aortico. *Italian Digital Biomanufacturing Network 3rd National Congress*.
- [I11] Fanni, B. M., Sauvage, E., Capellini, K., Landini, L., Positano, V., Capelli, C. and Celi, S. (2019, October). A corrected formulation for the image-based inferring of patient-specific material properties. *IX Annual Meeting of the Italian Chapter of the European Society of Biomechanics 2019*.
- [I12] Capellini, K., Fanni, B. M., Gasparotti, E., Di Leonardo, M., Cerone, E., Positano, V., Landini, L., Berti, S. and Celi, S. (2019, October). In-silico assessment of thrombosis risk: a CFD study of left atrial and left atrial appendage. *IX Annual Meeting of the Italian Chapter of the European Society of Biomechanics 2019*.
- [I13] Capellini, K., Cella, U., Costa, E., Gasparotti, E., Fanni, B. M., Biancolini, M. E. and Celi, S. (2019, October). A coupled CFD and RBF mesh morphing technique as surrogate for one-way FSI study. *IX Annual Meeting of the Italian Chapter of the European Society of Biomechanics 2019*.
- [I14] Zaccaria, A., Gasparotti, E., Fanni, B. M., Migliavacca, F., Pennati, G., Petrini, L. and Celi, S. (2019, October). Finite element model of a left atrial appendage occlusion device. *IX Annual Meeting of the Italian Chapter of the European Society of Biomechanics 2019*.
- [I15] Fanni, B. M., Sauvage, E., Capelli, C., Gasparotti, E., Vignali, E., Schievano, S., Landini, L., Positano, V. and Celi, S. (2019, September). A numerical and 3D printing framework for the in vivo mechanical assessment of patient-specific cardiovascular structures. *2nd International Conference on Simulation for Additive Manufacturing, Sim-AM 2019*. (pp. 31-39). International Centre for Numerical Methods in Engineering.
- [I16] Antonuccio, M. N., Fanni, B. M., Capellini, K., Sauvage, E., Mariotti, A., Capelli, C. and Celi, S. (2019, September). An integrated approach of uncertainty quantification and 3D MRI techniques in guiding CFD analysis for a non-invasive study of aortic coarctation. *Workshop on Frontiers of Uncertainty Quantification in Fluid Dynamics*.
- [I17] Fanni, B. M., Sauvage, E., Celi, S., Landini, L., Schievano, S., Positano, V. and Capelli C. (2019, September). A modified formulation of the QA method for inferring materials properties for enhanced patient-specific computational models. *BioMedEng19 Conference*.
- [I18] Fanni, B. M., Sauvage, E., Schievano, S., Landini, L., Celi, S., Positano, V. and Capelli C. (2019, July). Indirect evaluation of material properties of large blood vessels based on in silico and in vitro models. *25th Congress of the European Society of Biomechanics 2019*.

Others

- [O1] Fanni, B. M., Capellini, K. and Celi, S. (2019, September). Applicazione dell'uncertainty quantification in campo cardiovascolare: esempi con codice commerciale. *Workshop: Uncertainty Quantification in Modern Science*.
- [O2] Gasparotti, E., Vignali, E., Capellini, K., Fanni, B. M., Cerillo, A. G., Berti, S., Positano, V., Landini, L. and Celi, S. (2018, December). A healthcare digital twin using integrated imaging and finite element model: developing a pre-planning phase to improve the performances of a Cardioband procedure for the treatment of mitral regurgitation. *EnginSoft Newsletter: Simulation Based Engineering & Data Sciences, EnginSoft*.

Additional Research Activities

- Supervisor of 8 Master theses in Biomedical Engineering at University of Pisa (2018-2021)
- Honorary contract for visitor researcher at Great Ormond Street Hospital, London, United Kingdom (2019-2020)
- Reviewer for scientific journals (SAGE Publishing)
- Lecturer for the course "Principles for Diagnostic Methods" at faculty of Biomedical Engineering, University of Pisa (2018-2021)