Alessio Tamborini

atambori@caltech.edu • linkedin.com/alessiotamborini • alessiotamborini.github.io

Postdoctoral Scholar Research Associate in Medical Engineering at Caltech specialized in innovative non-invasive diagnostic technologies for cardiology and ophthalmology. With a PhD from Caltech, my research has resulted in published papers, patents, licenses, and FDA-approved devices. I excel in medical device development and data analysis with machine learning. Recognized for my determination, creativity, and discipline, I am dedicated to revolutionizing medical technology, with aspirations to either establish a medical device company or secure an academic position.

EDUCATION

Ph.D., Medical Engineering *June 2023*
California Institute of Technology, Pasadena CA
Thesis Title: A Novel Approach to Cardiac Health Assessment: Redesign of the Brachial Cuff Device
Advisor: Morteza Gharib

M.S., Medical Engineering *June 2019*
California Institute of Technology, Pasadena CA
Cumulative GPA*:* 3.90/4.00

B.S., *summa cum laude,* Biomedical Engineering *May 2018*
Boston University, Boston, MA
Cumulative GPA: 3.86/4.00

PROFESSIONAL EXPERIENCE

Consultant in MedTech *Sept 2023 - Present*
Ventric Health

Postdoctoral Scholar Research Associate in Medical Engineering *July 2023 - Present*
Department of Engineering and Applied Science, California Institute of Technology
PI: Morteza Gharib

Ph.D. Student in Medical Engineering *Oct. 2018 – June 2023*
Department of Engineering and Applied Science, California Institute of Technology
PI: Morteza Gharib

Research Trainee *Sept. 2017 – June 2018*
Department of Radiology, Brigham and Women's Hospital
PI: Oliver Jonas

Undergraduate Research Assistant *June 2017 – Aug. 2017*
Koch Institute, Massachusetts Institute of Technology
PI: Oliver Jonas

Undergraduate Research Assistant in Biomedical Engineering *May 2016 – June 2017*
College of Engineering, Boston University
PI: Christopher Chen

RESEARCH EXPERIENCE

Redesign of the Brachial Blood Pressure Cuff - PI: Morteza Gharib

- Designed and manufactured a novel blood pressure cuff system for high-fidelity pulse waveform acquisition
- Enrolled the device in a healthy control study and a clinical trial with subjects undergoing left heart catheterization
- Demonstrated device's accuracy and reliability for non-invasive cardiovascular assessment of central pressure and left ventricular function

Drug Delivery Studies with Implantable Microdevice - PI: Oliver Jonas

- Performed *in vivo* tumor study of platinum-containing chemotherapeutic agents from implantable micro-device
- Designed high-throughput assay to assess local effect of drug delivery on tumor cells
- Developed protocol to analyze cellular transcriptome using RNA sequencing in response to localized treatment

Studies of 3D Topography Cell Migration - PI: Christopher Chen

- Studied the effects of surface curvature and topographical features for individual and collective cell migration
- Printed finely tuned 3D ridge and wave structures with regulated topographical and geometrical features
- Analyzed cell migration patterns through template matching from fluorescent time-lapse microscopy images

PUBLISHED CONTENT

- **Publication:** Aghilinejad, A., Tamborini, A., & Gharib, M. (2024). A New Methodology for Determining the Central Pressure Waveform from a Peripheral Measurement using Fourier-based Machine Learning. *Artificial Intelligence in Medicine.* https://doi.org/10.1016/j.artmed.2024.102918
- **Publication:** Tamborini, A., & Gharib, M. (2024). Validation of a Suprasystolic Cuff System for Static and Dynamic Representation of the Central Pressure Waveform. *Journal of the American Heart Association*. https://doi.org/10.1161/JAHA.123.033290
- **Publication:** Tamborini, A., & Gharib, M. (2023). A pneumatic low-pass filter for high-fidelity cuff-based pulse waveform acquisition. *Annals of Biomedical Engineering*. https://doi.org/10.1007/s10439-023-03312-z
- **Publication:** Cheng, D., Jayne, R. K., Tamborini, A., Eyckmans, J., White, A. E., & Chen, C. S. (2019). Studies of 3D directed cell migration enabled by direct laser writing of curved wave topography. *Biofabrication*, *11*(2), 021001. https://doi.org/10.1088/1758-5090/ab047f
- **Patent:** Tamborini, A., & Gharib, M. . Method for Cardiac Auscultation using Blood Pressure Cuff. US 2024/0108303 A1. Apr. 2024.
- **Patent:** Gharib, M., Harvard, A., Tamborini, A., & Jeon, D. . Systems, methods, and apparatuses for ocular measurements. US 11,839,427 B2. Dec, 2023.
- **Patent:** Tamborini, A., & Gharib, M. . Systems and methods for noninvasive pulse pressure waveform measurement. US 2023/0050058 A1. Feb. 2023.

PRESS COVERAGE

- (November 15th, 2024) Ripples From the Heart. *Caltech Magazine.* Retrieved from https://magazine.caltech.edu/post/ripples-from-the-heart
- (March 22nd, 2024) Charting the Course for Invention at Caltech. *Caltech ENGenuity*. Retrieved from https://engenuity.caltech.edu/stories/Charting-the-Course-for-Invention.
- (November 10th, 2023) Caltech Startup Receives FDA Clearance for Heart Health Diagnostics. *Caltech News.* Retrieved from https://www.caltech.edu/about/news/caltech-startup-receives-fda-clearance-for-heart-health-diagnostic.

CONFERENCE PROCEEDINGS AND ABSTRACTS

- Tamborini, A., & Gharib, M. (2022). Wearable Device for Simultaneous Pulse Pressure Waveform Analysis at Carotid Arteries, Biomedical Engineering Society Annual Meeting, Oct. 12-15, San Antonio, TX.
- Tamborini, A., & Gharib, M. (2021). Device for Simultaneous Pulse Pressure Waveform Acquisition and Analysis at the Carotid Arteries. APS Division of Fluid Dynamics Meeting, Nov. 21-23, Pheonix, AZ.
- Tamborini, A., & Gharib, M. (2020). Noninvasive Central Blood Pressure Measurement Methodology Inspired from Tonometry and Oscillometric Principles. APS Division of Fluid Dynamics Meeting, Nov. 22-24, (virtual).

PEER REVIEW EXPERIENCE

Annals of Biomedical Engineering ***March 2024 – Present***

- Number of Review: 2
- Topics: Novel Cardiovascular Interventional and Diagnostic Procedures

Health Science Reports ***July 2024 - Present***

- Number of Review: 1
- Topics: Pediatric Cardiac Surgery Devices

ENGINEERING PROJECTS

Wearable Device for Simultaneous Pulse Waveform at Carotid Arteries ***Sept. 2020- Feb. 2021***

- Designed and produced a neck collar for automated acquisition of the pulse pressure waveform at both carotid arteries

Sinus Topical Drug Delivery Medical Device ***Sept. 2017 – Dec. 2017***

- Prototyped a handheld ENT surgical device for localized topical drug delivery systems to the sinus cavities
- Collaboration with Dr. Michael Platt from Boston Medical Center

RESEARCH FELLOWSHIPS AND SCHOLARSHIPS

- The David Gakenheimer Fellowship, California Institute of Technology (09/2019-09/2021)
- Andrew and Peggy Cherng Department of Medical Engineering Fellowship, California Institute of Technology (9/2018-7/2023)
- Summer Undergraduate Research Fellowship, Boston University (05/2016-08/2016)
- Presidential Scholarship, Boston University (9/2014-05/2018)

TEACHING EXPERIENCE

California Institute of Technology

- Research mentor for Summer Undergraduate Research Fellowship Program (05/2019-07/2019)

Boston University

- Teaching Assistant for Engineering Mechanics I (EK 301) with Prof. G. Holt (01/2016-05/2016)

PROFESSIONAL SOCIETIES

- Biomedical Engineering Society, member
- Tau Beta Pi Society, member

SKILLS

Computer Applications: Proficient in Python, C/C++, Java, MATLAB, SolidWorks and CREO
Languages: Fluent in Spanish and Italian