

Andre R. Montes

POSTDOCTORAL RESEARCH FELLOW · NATIONAL INSTITUTES OF HEALTH

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University of California, Berkeley

M.S./PH.D. MECHANICAL ENGINEERING

- *Thesis*: Multiscale Biophysical Dynamics of Cell Adhesion and Integrin Mechanosensing in silico
- Advisers: Mohammad Mofrad, Ph.D. & Grace O'Connell, Ph.D.

Aug 2019 - May 2024

GPA: 3.96/4.00

Colorado School of Mines

B.S. MECHANICAL ENGINEERING

- *Emphasis in Biomechanics*

Aug 2013 - Aug 2016

Summa Cum Laude

Awards, Fellowships, & Grants

2023	Graduate Research Grant , Hearts to Humanity Eternal	\$ 10,000
	Transfer-to-Excellence NSF REU Mentor , UC Berkeley College of Engineering	\$ 1,000
2022	Ford Predoctoral Fellowship , National Academies of Science Engineering & Medicine	\$ 81,000
2021	Robert N. Noyce Fellowship , UC Berkeley College of Engineering	\$ 75,000
	Diversity & Community Fellowship , UC Berkeley Graduate Division	\$ 16,500
	SURF SMART Fellowship , UC Berkeley Graduate Division	\$ 5,000
	EDGE in Mentoring , UC Berkeley CITRIS	\$ 1,000
	Departmental Diversity Award , UC Berkeley Dept of Mechanical Engineering	\$ 1,000
2020	Graduate Remote Instruction Innovation Fellowship , UC Berkeley Graduate Division	\$ 5,000
2019	Graduate Student Research Fellowship , UC Berkeley College of Engineering	\$ 18,000

Publications

*co-author

Montes A, Barroso A, Wang W, O'Connell GD, Tepole AB, Mofrad MRK. 2023. Integrin-based Mechanosensing relies on Pivot-Clip Mechanism to Reinforce Cell Adhesion. *Biophysical Journal*. <https://doi.org/10.1016/j.bpj.2024.06.008>

Montes A, Gutierrez G, Tepole AB, Mofrad MRK. 2023. Multiscale Computational Framework to Investigate Integrin Mechanosensing and Cell Adhesion. *Journal of Applied Physics*, 134, 114702.

McKinley J*, **Montes A***, Wang M, Kamath A, Jimenez G, Lim J, Marathe S, Mofrad MRK, O'Connell GD. 2022. Design of a flexing organ-chip to model *in situ* loading of the intervertebral disc. *Biomicrofluidics*, 16, 054111.

Montes A*, Arevalo S*, O'Connell GD. 2022. Research seminar designed for undergraduate students builds confidence and access to research opportunities. *Proceedings of ASEE Conference*. 37513

Harris M, McCarty M, **Montes A**, Celik, O. 2016. Enhancing Haptic Effects Displayed via Neuromuscular Electrical Stimulation. *Proceedings of DSC Conference*. V001T07A003.

Presentations

*presenting author

CONFERENCE PRESENTATIONS

Montes A*, Tepole AB, Mofrad MRK. Oct 2023. Mechanobiological Insights and Unfolding Molecular Dynamics of Cell-Matrix Bond Mutant. *Biomedical Engineering Society Annual Conference*. Podium Talk. Seattle, Washington.

Montes A*, Tepole AB, Mofrad MRK. Oct 2022. Towards a Multiscale Mechanical Model of Cell Adhesion Dynamics. *Biomedical Engineering Society Annual Conference*. Podium Talk. San Antonio, Texas.

Montes A*, McKinley J, Mofrad MRK, O'Connell GD. June 2021. Development of a Deformable Microfluidic Chip to Replicate Tissue Strains in situ *Summer Biomechanics, Bionengineering, and Biotransport Conference*. Podium Talk. Virtual.

Montes A*. Jan 2021. Spine-on-a-chip: We got your back. *Global Young Scientists Summit*. Video Abstract. Virtual.

Harris M*, McCarty M, **Montes A**, Celik O. Apr 2016. Experiments on Inducing Haptic Effects on the Elbow via Neuromuscular Electrical Stimulation. *IEEE Haptics Symposium*. Podium Talk. Philadelphia, PA.

MENTORED UNDERGRADUATE PRESENTATIONS

Barroso A*, **Montes A**, Mofrad MRK. Nov 2023. Fibronectin Binding Site Mutation Reroutes Force to Decrease Cell Adhesion. *Annual Biomedical Research Conference for Minoritized Scientists*. Poster. Phoenix, AZ.

SACNAS Bioengineering Research Presentation Award: Wang W*, **Montes A**, O'Connell GD. Oct 2023. Computational Examination of Mutant Fibronectin's Biophysical Dynamics. *SACNAS NDiSTEM Conference*. Poster. Portland, OR.

Gutierrez G*, **Montes A**, O'Connell GD, Mofrad MRK. Aug 2022. Modeling Cell Adhesion Molecules as a Mechanical System. *NSF CAMP Symposium*. Poster. Berkeley, CA.

Baeza M*, **Montes A**, Mofrad MRK. Nov 2021. Quantifying cell elasticity through a microchannel using finite element analysis. *McNair Scholars Research Conference*. Poster. Miami, FL.

Lim J*, **Montes A**, Mofrad MRK. Aug 2021. Computationally revealing cell elasticity within a micro-stretching device. *Berkeley SURF Symposium*. Poster. Virtual.

Lindgren J*, **Montes A**, Mofrad MRK. Aug 2021. Quantifying cell elasticity by modeling microfluidics. *Berkeley CalTeach Summer Research Symposium*. Poster. Virtual.

Wang M*, **Montes A**, McKinley J, O'Connell GD, Mofrad MRK. May 2021. Determining Mechanical Strains of Cells in 2D vs 3D Culture within a Deforming Microphysiological Chip. *Berkeley Bioengineering Research Symposium*. Poster. Virtual.

Cruz F*, **Montes A**, McKinley J, O'Connell GD, Mofrad MRK. Aug 2020. Spine-on-a-chip: Finite Element Modeling of Strains in the Annulus Fibrosus. *Berkeley CalTeach Summer Research Institute Symposium*. Poster. Virtual.

INVITED TALKS

Mar 2024. *Multiscale Biophysical Dynamics of $\alpha_5\beta_1$ Integrin Mechanosensing in silico*. Speaker. MATRICES Lab - National Institutes of Health, Bethesda, MD.

Feb 2024. *Biomolecular Machinery of Cell Adhesion*. Speaker. Mechanobiology Symposium. University of Pennsylvania. Philadelphia, PA.

Feb 2024. *Cell Biomechanics under a Computational Microscope*. Dept of Engineering, Harvey Mudd College, Claremont, CA

Feb 2024. *Atomic Bonding and Crystal Structures*. Dept of Engineering, Harvey Mudd College, Claremont, CA

Dec 2023. *Biomolecular Machinery of Cell Adhesion*. Speaker. Dept. Mechanical Engineering, MIT, Virtual.

Nov 2023. *Biomolecular Machinery of Cell Adhesion*. Speaker. Complex In Vitro Systems - Genentech, Virtual.

May 2023. *Cell Adhesion via Integrin Mechanosensing in silico*. Speaker. Biomedical Engineering Research Seminar for Wisconsin Prof Future Faculty Workshop, University of Wisconsin, Madison.

March 2023. *Cell Adhesion and Integrin Mechanosensing*. Speaker. Guest lecture for Molecular Biomechanics and Mechanobiology of the Cell, UC Berkeley.

March 2022. *Multiscale Modeling in Cell Biomechanics*. Speaker. Special Topics in Biomechanical Engineering Seminar, UC Berkeley.

Teaching Experience

Summer 2024 **ENGIN101 Introduction to Engineering**, *Instructor* | Rating: N/A | Class: 24 Pre-College Students | In-Person | Developed lesson plans, labs, and practice problem sets for two 3-week sessions. I introduced students to the exciting world of engineering through hands-on activities which included a force-sensing gripper, finite element simulations, and molecular dynamics.

Columbia University

Summer 2021	ME W85 Introduction to Solid Mechanics , <i>Graduate Student Instructor</i> Rating: 4.6/5.0 Class: 40 undergraduates Online Developed synchronous and asynchronous lesson plans and practice problems for three weekly discussion sections. Graded homeworks, midterms, and final exam.	<i>UC Berkeley</i>
Spring & Fall 2021	ME 198/298 Finding Your Research Pathway , <i>Instructor</i> Class: 20 undergraduates In-person Co-developed and hosted weekly research seminar for undergraduate in engineering. Presented lectures on research methods, finding a lab, and pathways to graduate school. Invited speakers included UC Berkeley professors and graduate students.	<i>UC Berkeley</i>
Fall 2020 Spring 2021	E295 Communications for Engineering Leaders , <i>Graduate Student Instructor</i> Rating: 4.2/5.0 Class: 3-4 sections of 25 Masters of Engineering students Hybrid Coached students through lectures and interactive discussions on clear technical communication. Provided feedback on writing materials and technical presentations for industry-sponsored capstone projects.	<i>UC Berkeley</i>
Spring 2015	ENGN250 Multidisciplinary Engineering Lab , <i>Undergraduate Teaching Assistant</i> Class: 2 sections of 24 undergraduates Assisted in hands-on instrumentation lab. Actively troubleshooted hardware and software bugs during experiments spanning thermodynamics, energy conservation, and mechanics.	<i>CSM</i>

Professional Experience

Dec 2019 Jun 2020	Research Engineer , <i>Samay (formerly Respira Labs)</i> - Wearable acoustic device for diagnosing and monitoring COPD. Developed and tested flexible composite prototypes that improved skin adhesion and comfort while minimizing signal noise. Led and completed successful first phase submission for a \$225K NSF SBIR grant.
Aug 2016 Jun 2019	R&D Engineer , <i>Philips Healthcare</i> - Developed and tested cardiovascular wires and catheters to diagnose and treat arterial blockages in the heart and the legs. Optimized acoustic pressure output to disrupt mock lesions while improving catheter durability to repeated acoustic shocks.

Outreach & Professional Development

SERVICE AND OUTREACH

June 2024	Biomedical Engineering Society , Conference Abstract Reviewer	<i>Baltimore, MD</i>
Sept 2023	Biomechanics and Modeling in Mechanobiology Journal , Reviewer	<i>UC Berkeley</i>
Jan 2023	Bioengineering Faculty Search , Student Committee Chair	<i>UC Berkeley</i>
Aug 2022	Discipline Cluster , Graduate Student Instructor Workshop Leader	<i>UC Berkeley</i>
Fall 2021	First Steps in Research , Founder and Director	<i>UC Berkeley</i>
Fall 2020	Latino/a Assoc. of Grad Students in Engineering & Science , Outreach Chair	<i>UC Berkeley</i>
Fall 2020	First-Gen &/or Low-Income Grads , Co-founder	<i>UC Berkeley</i>

PANELS & EVENTS

Mar 2023	Diversity Days at Cal , Lead Organizer - Office for Grad Diversity	<i>UC Berkeley</i>
Mar 2023	Minoritized Grad Student Experience at Cal , Host - Office for Grad Diversity	<i>UC Berkeley</i>
Mar 2023	Path to the Professoriate - Qualifying Exam , Panelist - Office for Grad Diversity	<i>UC Berkeley</i>
Jan 2023	MechE Grad Student Recruitment Panel , Panelist - Mechanical Engineering	<i>UC Berkeley</i>
Nov 2022	Garden State LSAMP Conference , Grad Recruiter - Office for Grad Diversity	<i>NJIT</i>
Nov 2022	CA Forum for Grad Diversity in Education , Grad Recruiter - Office for Grad Diversity	<i>Long Beach</i>
Oct 2022	Ford Predoctoral Fellowship Workshop , Host and Panelist - Office for Grad Diversity	<i>UC Berkeley</i>
Oct 2022	Graduate Diversity Admissions Fair , Host and Panelist - Office for Grad Diversity	<i>UC Berkeley</i>
Apr 2022	Exchange by the Gate , Organizer - Office for Grad Diversity	<i>UC Berkeley</i>
Nov 2021	Town Hall for Foster and System-Impacted Youth , Organizer - Office for Grad Diversity	<i>UC Berkeley</i>

DEVELOPMENT

WiscProf Future Faculty In Engineering 2023, *Madison, WI* | Designed for doctoral students within their last two years of study and postdoctoral scholars in the last year of their research, this exciting, expenses-paid four-day program is an invaluable opportunity to learn more about academic careers and how to succeed in a faculty position.

NextProf Nexus Future Faculty Workshop 2022, *Berkeley, CA* | A multi-day program that is part of a nationwide effort to strengthen and diversify the next generation of academic leaders in engineering. Sponsored by: Michigan, UC Berkeley and Georgia Tech.