

# Derek Nichols

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## EDUCATION

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GEORGIA INSTITUTE OF TECHNOLOGY, ATLANTA, GA

*Expected Graduation: April 2023*

*Ph.D., M.S., Mechanical Engineering*

- Graduate Research Advisor: Dr. Ari Glezer
- Proposed Thesis Title: Characterization and Control of Inlet Nacelle Flow in the Presence of Crosswind and Ground Effects
- Minor Degrees: Environmental Fluid Mechanics; Teaching in Higher Education

UNIVERSITY OF PITTSBURGH, PITTSBURGH, PA

*Graduation Date: April 30, 2017*

*B.S., Mechanical Engineering*

- *Summa Cum Laude*
- Minor Degrees: Bioengineering; Mathematics

## RESEARCH EXPERIENCE

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FLUID MECHANICS RESEARCH LAB (FMRL)

2017 - Present

*Georgia Institute of Technology, Professor Ari Glezer*

- Funded by The Boeing Company, Georgia Tech, and the NSF GRFP
- Perform experiments to better understand nacelle separation produced by crosswinds
- Develop new and innovative ways to negate the effects of inlet separation during takeoff and landing
- Investigate the effect of the ground plane and the possible formation of a ground vortex

OSTEOCHONDRAL BIOREACTOR RESEARCH PROJECT

2014 -  
February

*University of Pittsburgh, Dr. Paolo Zunino and Dr. Riccardo Gottardi*

- Developed microfluidic bioreactor prototypes used to test drugs for osteoarthritis
- Optimized model to maximize drug exposure to the test cells
- Simulated fluid flow and 3D printed models tested in a laboratory to compare results

## JOURNAL PUBLICATIONS

- **D. Nichols**, I. Sondh, S. Little, P. Zunino, R. Gottardi. Design and validation of an osteochondral bioreactor for the screening of treatments for osteoarthritis. *Biomedical Microdevices*. February 14, 2018.
- **D. Nichols**, I. Sondh, P. Zunino, R. Gottardi. Creating an Osteochondral Bioreactor for the Screening of Treatments for Osteoarthritis. *Ingenium 2017*. February 2017.

## CONFERENCE PAPERS

- **D. Nichols**, B. Vukasinovic, A. Glezer, B. Rafferty. Formation of a Nacelle Inlet Ground Vortex in Crosswind. *AIAA SciTech 2022 Forum*. January 5, 2022.
- **D. Nichols**, B. Vukasinovic, A. Glezer, M. DeFore, B. Rafferty. Steady and Unsteady Control of Nacelle Inlet Flow in Crosswind. *AIAA SciTech 2021 Forum*. January 4, 2021.
- **D. Nichols**, B. Vukasinovic, A. Glezer, M. DeFore, B. Rafferty. Fluidic Control of Nacelle Inlet Flow in Crosswind. *AIAA Aviation 2020 Forum*. June 17, 2020.
- **D. Nichols**, B. Vukasinovic, A. Glezer, M. DeFore, B. Rafferty, F. Palacios. Characterization and Control of a Nacelle Inlet Flow in Crosswind. *AIAA Aviation 2019 Forum*. June 21, 2019.

## CONFERENCE PRESENTATIONS

- **D. Nichols**, B. Vukasinovic, A. Glezer. Vortex Dynamics in Axisymmetric Inlet Over a Plane in a Cross Flow. *74th Annual Meeting of the APS Division of Fluid Dynamics*. November 21, 2021.
- **D. Nichols**, B. Vukasinovic, A. Glezer, M. DeFore, B. Rafferty. Adaptable Fluidic Control of Round Inlet Flow in Cross Flow. *73rd Annual Meeting of the APS Division of Fluid Dynamics*. November 22, 2020.
- **D. Nichols**, B. Vukasinovic, A. Glezer, M. DeFore, B. Rafferty. Fluidic Control of Round Inlet Flow in a Crosswind. *72nd Annual Meeting of the APS Division of Fluid Dynamics*. November 25, 2019.
- R. Gottardi, G. Riccardis, M. Avolio, **D. Nichols**, et al. A 3D Printed Microfluidic Bioreactor to Engineer Biphasic Construct. *2018 AIChE*. November 1, 2018.
- R. Gottardi, G. Riccardis, M. Avolio, **D. Nichols**, et al. A 3D Printed Microfluidic Bioreactor to Engineering Biphasic Musculoskeletal Construct. *Tissue Engineering and Regenerative Medicine International Society – World Annual Meeting*. September 6, 2018.

## POSTERS

- F. Donnalaja, G. Riccardis, **D. Nichols**, et al. Osteochondral Bioreactor for Drug Screening and Toxicity Assessments. 26th Congress of the European Society of Biomechanics. July 13, 2021.
- R. Gottardi, G. Riccardis, M. Avolio, **D. Nichols**, et al. A 3D Printed Microfluidic Bioreactor to Engineering Biphasic Musculoskeletal Construct. Biomedical Engineering Society Annual Meeting, Atlanta, GA. October 18, 2018.
- R. Gottardi, G. Riccardis, **D. Nichols**, et al. A 3D Printed Microfluidic Bioreactor to Engineering Biphasic Musculoskeletal Construct. Orthopedic Research Society Annual Meeting, New Orleans, LA. March 2018.
- **D. Nichols**, I. Sondh, P. Zunino, R. Gottardi. Optimizing an Osteochondral Bioreactor for the Screening of Treatments for Osteoarthritis. Science 2016, Pittsburgh, PA, October 2016.
- I. Sondh, **D. Nichols**, E. Bayer, R. Gottardi, S.R. Little. Development of a bioreactor aimed at designing spatial and temporal drug delivery profiles for bone regeneration protocols. Biomedical Engineering Society Annual Meeting, Minneapolis, MN, October 2016.

## PATENT APPLICATIONS

- “Adaptable Flow Control for Engine Nacelles,” B. Rafferty, M. DeFore, A. Glezer, B. Vukasinovic, **D. Nichols**. Application No 15/931,328. November 11, 2021.
- “Aerodynamic Flow Control Systems and Methods,” A. Glezer, B. Vukasinovic, **D. Nichols**. Application No PCT/US2019/063764. June 4, 2020.

## TEACHING EXPERIENCE

Undergraduate Fluid Mechanics Teaching Associate	Fall 2021
• Average CIOS score of 4.93/5 measuring overall teaching effectiveness	
Undergraduate Fluid Mechanics Teaching Associate	Fall 2020
• Average CIOS score of 4.85/5 measuring overall teaching effectiveness	
Georgia Tech’s Tech to Teaching Certificate	Fall 2020
Center for the Integration of Research, Teaching, and Learning (CIRTL) Associate Level Certificate	Spring 2020
Undergraduate Fluid Mechanics Teaching Assistant	Fall 2019
• Average CIOS score of 4.91/5 measuring overall teaching effectiveness	
MEMS Senior Design Undergraduate Teaching Assistant	Spring 2017
MEMS Fundamentals of Engineering Projects Undergraduate Teaching Assistant	Spring 2017

## LEADERSHIP AND SERVICE

FMRL Lab Manager	2021 - Present
• Manage lab operations, oversee lab/laser inspections, and schedule preventative maintenance on equipment	
• Redesigned and maintain lab website ( <a href="https://fmrl.gatech.edu">https://fmrl.gatech.edu</a> )	
Woodruff School Graduate Mental Health and Wellness Committee Member	2021 - Present
• Advocate for graduate student rights and protective policies within the department	
• Ideate, design, and execute conflict resolution tool with support from the department	
Georgia Tech President’s Undergraduate Research Award (PURA) Reviewer	2019 - Present
Georgia Tech Muay Thai Senior Member - Officer	2017 - 2020
Georgia Tech NASA Robotic Mining Mechanical Engineering Lead	2018
Pitt MEMS Senior Design Project Sponsor	Spring 2017
Pitt Makerspace Volunteer	2015 - 2017

## AWARDS & HONORS

National Science Foundation Graduate Research Fellowship Program (NSF GRFP) Fellow	2019 - Present
AIAA Orville and Wilbur Wright Graduate Award	2019
Georgia Tech President’s Fellowship	2017 - 2020
Pitt Mobile App Challenge - Finalist	2017
Best MEMS Senior Design Presentation	2016
Pitt SSOE Design Expo - 2nd Overall MEMS Design	2016
Pitt SSOE Design Expo - 2nd Overall ECE Design	2016
SSOE Summer Research Scholarship	2016

## PROFESSIONAL SOCIETIES

American Institute of Aeronautics and Astronautics	2018 - Present
American Physical Society	2018 - Present
American Society of Mechanical Engineers	2021 - Present
Pi Tau Sigma Mechanical Engineering Honor Society	2015 - Present