# ROBBIE COURTER

rj.qrtr@comcast.net ▪ (804) 814-4146 ▪ Boulder, CO ▪ https://robbiequarter.github.io

## EDUCATION

**PhD** Integrative Physiology — *May 2020 – December 2023*
UNIVERSITY OF COLORADO BOULDER — Boulder, CO

**MS** Integrative Physiology — *August 2018 – May 2020*
UNIVERSITY OF COLORADO BOULDER — Boulder, CO

**BS** Biomedical Engineering — *August 2014 - May 2018*
UNIVERSITY OF VIRGINIA — Charlottesville, VA

- Degree conferred with "High Distinction"

## RESEARCH & PROFESSIONAL EXPERIENCE

NEUROMECHANICS LABORATORY — *August 2018 – Present*
**Graduate Research Scientist** — Boulder, CO

- Part of the University of Colorado Boulder Departments of Integrative Physiology and Mechanical Engineering
- Researching and publishing in peer-reviewed journals on the interplay of motor control and the brain during healthy aging and in Multiple Sclerosis.
- Designing and implementing novel experiments to collect and analyze human biomechanics data in clinical populations using MATLAB, R, and Python in harmony.

SPECIALIZED BICYCLE COMPONENTS — *May 2022 – May 2023*
**Data Scientist and Scientific Advisor** — Morgan Hill, CA

- Developed, trained, and deployed machine learning models in Python for a web app that provided reliable bike fit measurements from user-provided video.
- Accuracy improved by nearly 15-fold while leveraging a dataset 10-times smaller with our model, as compared to the company's pre-existing implementation.
- Advised on all aspects of the scientific process and liaised between diverse technical, software, and executive teams.

UNIVERSITY OF COLORADO BOULDER — *August 2018 – May 2023*
**Graduate Teaching Assistant** — Boulder, CO

- Led teams of 5-10 teaching assistants and helped develop course material alongside the instructor as the Lead Teaching Assistant for the Biomechanics and Statistics classes.
- Eight semesters of teaching experience in Biomechanics, Exercise Physiology, and Advanced Graduate Statistics of class sizes ranging from 15-60 students.

MOTION ANALYSIS AND MOTOR PERFORMANCE LAB *October 2015 - May 2018*
**Undergraduate Research Scientist** Charlottesville, VA

- Part of the University of Virginia Departments of Orthopedic Surgery and of Biomedical Engineering
- Designed motion analysis research in pediatric patients with cerebral palsy and in animals following tissue-engineered muscle repair.
- Leveraged motion capture technology, MATLAB, and OpenSim to model, simulate, and analyze the neuromusculoskeletal system.

CONTRALINE *July 2016 - October 2016*
**Research Intern** Charlottesville, VA

- Assisted with pre- and post-op animal care for initial FDA clinical animal trials on rats.
- Worked with lead veterinarian in developing tissue histology protocols.
- Improved skills of medical device R&D, FDA regulatory approval, and business development.

MOTION ANALYSIS AND MOTOR PERFORMANCE LAB *May 2016 - August 2016*
**Undergraduate Research Intern** Charlottesville, VA

- Designed and tested a novel setup in Vicon for performing motion capture on rats
- Built and validated a rat hindlimb model in OpenSim for use in motion analysis

## SKILLS

**Programming**: MATLAB, R, Python, SQL (MySQL), Java

**Software**: Git, Markdown, Adobe Illustrator, Google MediaPipe Pose, OpenSim, VICON Nexus

**Biomechanics Laboratory:** VO2/Metabolic Testing, Motion Analysis, Motion Capture, Clinical Populations, Musculoskeletal Modeling

**Skills:** Statistical Analysis, Statistical Modeling, Data Visualization, Scientific Writing and Communication, Public Speaking, Grant Writing, IRB/Regulatory Document Writing

**Interests:** Gravel cycling, trail running, Premier League soccer, fly fishing, reading fantasy, coffee

## PROFESSIONAL TRAINING

**Introduction to Data Science in Python** *May 2022*
Coursera, University of Michigan
Credential ID 7V7NHX4EEW75

**Inferential Statistical Analysis with Python Certificate** *September 2021*
Coursera, University of Michigan
Credential ID 83C667LM6XWD

**Understanding and Visualizing Data with Python Certificate** *August 2021*
Coursera, University of Michigan
Credential ID QLDRH4C5YDPN

**CITI Human Subjects Research Certification** *November 2022*
CITI Program
Credential ID 47360374

**Graduate Teaching Program** *Fall 2018*
University of Colorado Boulder, Boulder, CO

## PUBLICATIONS

### *Manuscripts*

**Courter, R. J.**, Alvarez, E., Enoka, R. M., & Ahmed, A. A. (2023). Metabolic costs of walking and arm reaching in persons with mild multiple sclerosis. *Journal of Neurophysiology*, *129*(4), 819–832. https://doi.org/10.1152/jn.00373.2022

[Under Review at *Journal of Neuroscience*]
Summerside, E. M., **Courter, R. J.**, Shadmehr, R., & Ahmed, A. A. (2023). Effort cost of reaching prompts vigor reduction in older adults. *bioRxiv.* https://doi.org/10.1101/2023.08.28.555022

[Under Review at *PLoS Computational Biology*]
Bruening, G. W., Sukumar, S., **Courter, R. J.**, O'Brien, M. K., & Ahmed, A. A. (2023). Disentangling the effects of metabolic cost and accuracy on movement vigor. *bioRxiv*. https://doi.org/10.1101/2023.02.08.527734

[In preparation]
**Courter, R. J.**, Enoka, R. M., & Ahmed, A. A. (2023). Reward-mediated movement vigor is altered in multiple sclerosis.

### *Articles and Science Communication*

**Courter, R.** (2022, August 5). Faster, higher, stronger – together. *Science Buffs.* https://sciencebuffs.org/2022/08/05/faster-higher-stronger-together/

**Courter, R. J.,** & Ahmed, A. A. (2019). To break a habit, timing's everything. *Nature Human Behaviour*, 1–2. https://doi.org/10.1038/s41562-019-0744-x

### *Conference Proceedings*

**Courter, R.**, Alvarez, E., Enoka, R., & Ahmed, A. (2023). Movement-specific changes in energy expenditure for persons with mild multiple sclerosis. *Multiple Sclerosis and Related Disorders*, *73*, 104653. https://doi.org/10.1016/j.msard.2023.104653

**Courter, R.**, Enoka, R., Ahmed, A., *Energetic costs of walking, but not arm reaching, are elevated for persons with mild multiple sclerosis.* San Diego, CA: Society for Neuroscience, 2022.

**Courter, R.J.,** Summerside, E.M., Shadmehr, R., Ahmed, A. A. *Increased effort of moving in aging leads to differential slowing of movement time and reaction time.* Rocky Mountain American Society of Biomechanics Annual Conference. Estes Park, CO. 2022.

**Courter, R.J.,** Summerside, E.M., Ahmed, A. A. *Effort cost of reaching biases reward responsiveness towards reacting faster over moving faster*. Chicago, IL: Society for Neuroscience, 2021.

**Courter, R.J.,** Ahmed, A. A. *Effort modulates the response to reward in reaching movements*. Exhibitor 1-D-34. Society for the Neural Control of Movement, 2021.

**Courter, R.J.,** Ahmed, A. A. *On the consistency of preferred movement speeds*. Program No. 311.27. 2019 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2019.

**Courter, R.**, Ahmed, A. *Robust Approach for Eliciting Preferred Reaching Speed.* Rocky Mountain American Society of Biomechanics 9th Annual Conference. Estes Park, CO. 2019.

Dienes, J., Slater, C., Miller, P., Janson, K., **Courter, R.,** Franklin I., Christ, G.J., Russell, S.D. *Novel Kinetic Analysis of Rodent Gait After Volumetric Muscle Loss Injury*. Gait and Clinical Movement Analysis Society Annual Conference. Indianapolis, IN. 2018.

Dienes, J., Hu, X., Janson, K., Slater, C., **Courter, R.**, McCormack, K., Christ, G.J., Russell, S.D. *Modeling and Analysis of Gait Biomechanics after Volumetric Muscle Loss Injury*. Tissue Engineering and Regenerative Medicine Annual Conference and Exhibition. Charlotte, NC. 2017.

Dienes, J., Slater, C., Miller, P., **Courter, R.,** Tumperi, M., Janson, K., Christ, G.J., Russell, S.D. *Comprehensive Characterization of Rodent Gait Kinetics and Kinematics as a Standard of Comparison for Regenerative Therapies*. 6th Annual AR3T Symposium on Regenerative Rehabilitation. Pittsburgh, PA. 2017.

Dienes, J., Hu, X., Janson, K., Slater, C., **Courter, R.,** McCormack, K., Christ, G.J., Russell, S.D. *Analysis and Modeling of Rodent Gait Biomechanics in Response to Volumetric Muscle Loss Injury.* American Society of Biomechanics 41st Annual Conference. Boulder, CO. 2017.

### *Theses*

**Courter, R.J.,** Ahmed, A. A. (2023). *Movement Vigor in Multiple Sclerosis: A Neuromechanics Perspective.* Doctoral Thesis. University of Colorado Boulder, Boulder, CO.

**Courter, R.J.,** Ahmed, A. A. (2020). *Added effort modulates the response to reward in reaching movements*. Masters Research Project. University of Colorado Boulder, Boulder, CO.

**Courter, R**., Berne. (2018). *Doping and Cycling*. Undergraduate Sociotechnical Thesis, supported by the School of Engineering and Applied Science. University of Virginia, Charlottesville, VA.

**Courter, R**., Russell, S. (2018). *Design of an Instrumented Rig for Modeling and Analysis of Cycling Biomechanics on a Triathlon/TT Bicycle*. Undergraduate Capstone Report, supported by the School of Engineering and Applied Science. University of Virginia, Charlottesville, VA.

### *Acknowledged Contributions*

Brill, J. W., & Kram, R. (2021). Does the preferred walk–run transition speed on steep inclines minimize energetic cost, heart rate or neither? *Journal of Experimental Biology*, *224*(3), jeb233056. https://doi.org/10.1242/jeb.233056

Dienes, J. A., Hu, X., Janson, K. D., Slater, C., Dooley, E. A., Christ, G. J., & Russell, S. D. (2019). Analysis and Modeling of Rat Gait Biomechanical Deficits in Response to Volumetric Muscle Loss Injury. *Frontiers in Bioengineering and Biotechnology*, *7*. https://doi.org/10.3389/fbioe.2019.00146

## INVITED PRESENTATIONS AND LECTURES

**Guest Speaker**, "What causes movement slowness in multiple sclerosis?" Rocky Mountain MS Center's MS Young Professionals Network meeting. Denver, CO. July 2023.

**Rapid Podium,** "Metabolic costs of walking and reaching in persons with mild multiple sclerosis." Rocky Mountain American Society of Biomechanics Annual Conference. Estes Park, CO. April 2022.

**Guest Lecture**, "Multiple Regression." IPHY 5800 Advanced Statistics and Research Methods in Integrative Physiology. University of Colorado Boulder, Boulder CO. April 2021.

**Guest Speaker**, International Baccalaureate Graduation and Recognition Ceremony, Lee-Davis High School, Mechanicsville VA, January 2019.

**Paper Presentation**, "A Thesis Portfolio: Doping and Cycling," 31st Annual Undergraduate Research and Design Symposium at UVA, April 2018.

## Honors and Awards

**Dissertation Completion Fellowship** *Fall 2023*
University of Colorado Boulder
Award: $14,000

**Graduate School Domestic Travel Grant** *September 2022*
University of Colorado Boulder
Award: $300

**Summer Graduate School Fellowship** *Summer 2022*
University of Colorado Boulder
Award: $6,000

**Graduate and Professional Student Government Travel Award** *September 2019*
University of Colorado Boulder
Award: $300

**Graduate Student Travel Award** *March 2019*
Department of Integrative Physiology, University of Colorado Boulder
Award: $300

**Degree conferred with "High Distinction"** *May 2018*
University of Virginia
Cumulative GPA of at least 3.60

**Undergraduate Research and Design Symposium Finalist** *May 2018*
University of Virginia

**Class of 2018 Student Spotlight** *April 2017*
University of Virginia

## Professional Service

**Reviewer** *June 2021 - Present*
*Experimental Brain Research*

## Community Service

**Bike MS** *Summer 2019 - Present*
Volunteer/Participant, Colorado

**Davis Phinney Foundation for Parkinson's** *Fall 2018 – Fall 2019*
Volunteer, Boulder, CO

**CU Boulder Triathlon Team** *Fall 2018 – Present*

Race Volunteer, Boulder, CO

**Madison House at UVA** *Fall 2016 - Fall 2017*
Volunteer Soccer Coach, Charlottesville, VA

**Charlottesville Multisport** *Fall 2016 - Spring 2018*
Race Volunteer, Charlottesville, VA

## PROFESSIONAL AFFILIATIONS

**Society for the Neural Control of Movement** *2021 - Present*

**Society for Neuroscience** *2019 - Present*

**Biomedical Engineering Society** *2015 – 2018*

## OTHER

**CU Boulder Triathlon Team** *Fall 2018 - Present*

**UVA Triathlon Team** *Fall 2014 - Spring 2018*
Treasurer, Spring 2017 – Fall 2017

## REFERENCES

**Alaa Ahmed Ph.D.**
Neuromechanics Laboratory
Departments of Integrative Physiology & Mechanical Engineering
University of Colorado Boulder, Boulder, CO 80301
Alaa.Ahmed@colorado.edu | (303) 492-6063

**Rodger Kram, Ph.D.**
Locomotion Laboratory
Department of Integrative Physiology
University of Colorado Boulder, Boulder, CO 80301
Rodger.Kram@colorado.edu | (303) 492-7984

**Shawn Russell, Ph.D.**
Motion Analysis and Motor Performance Laboratory
Departments of Mechanical Engineering & Orthopedic Surgery
University of Virginia, Charlottesville, VA 22904
sdr2n@virginia.edu

**Ross Wilkinson, Ph.D.**
Fitbit, Inc.
ross.wilkinson@icloud.com | (720) 727-4774

**Steve Hobbs, Ph.D.**
Senior Instructor
Department of Integrative Physiology
University of Colorado Boulder, Boulder, CO 80301
Steven.Hobbs@colorado.edu | (303) 492-7629