

Niall L. Williams

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EDUCATION

University of Maryland, College Park, MD, USA Aug 2019 - Present

PhD in Computer Science

MS in Computer Science (May 2021)

– Research interests: Virtual/Augmented Reality, Human Perception & Navigation, Computer Graphics, Robotics

– Advisors: Dr. Dinesh Manocha, Dr. Ming C. Lin, Dr. Aniket Bera

Davidson College, NC, USA Aug 2015 - May 2019

B.S. with High Honors in Computer Science, 3.7 GPA

– Thesis Title: Estimation and Comparison of Rotation Gain Thresholds for Redirected Walking

– Advisor: Dr. Tabitha C. Peck

AWARDS & HONORS

Link Foundation Modeling, Simulation, & Training Fellowship (\$34,000) Aug 2022

Best Paper Honorable Mention (IEEE VR 2022) March 2022

Meta PhD Research Fellowship Finalist (top 6% out of 2,300+ applicants) Feb 2022

Best Paper Honorable Mention (IEEE ISMAR 2021) Oct 2021

Best Paper Honorable Mention (IEEE VR 2021) March 2021

Dean's Fellowship, University of Maryland, College Park (\$5,000) 2019, 2020

Senior Computer Science Award, Davidson College May 2019

Nominated for CRA Outstanding Undergraduate Researcher Award Oct 2018

RESEARCH EXPERIENCE

GAMMA Lab, University of Maryland College Park, MD USA

Research Assistant (Advisors: **Dinesh Manocha, Ming C. Lin, Aniket Bera**) Aug 2019 - Present

- Developing VR locomotion interfaces, using spatial computing, motion planning, and eye tracking, that aim to minimize the chance of collision with physical objects to improve immersion in VR experiences.
- Exploring the use of adaptive sampling (psychophysics) and physiological signals to efficiently estimate to what degree users tolerate visual motion gains during locomotion in virtual reality.
- Developed haptic interfaces that utilize mobile robots to provide real-time haptic feedback to guide the user experience more effectively, creating more immersive virtual experiences.
- Investigated and evaluated techniques for synthesizing and retargeting emotionally expressive gaits for realistic virtual avatars in social VR/AR settings.

Human Performance and Experience Lab, NVIDIA Research Santa Clara, CA USA

Research Intern (Manager: **Ruth Rosenholtz**) Jan 2024 - Present

- Studying human visual perception performance for video teleconferencing applications with digital humans.

Applied Perception Science Team, Meta Reality Labs Redmond, WA USA

Research Scientist Intern (Managers: **Ian Erkelens, Phillip Guan**) May 2022 - Aug 2022

- Studied human visual sensitivity to radial optic flow during and after vergence eye movements in a wide field-of-view, stereoscopic display. Worked in a cross-functional team with vision scientists and engineers.
- Studied the reliability and accuracy of an adaptive sampling psychophysical model (AEPsych) for efficiently measuring perceptual thresholds in experiments with many stimulus parameters.
- Delivered key results that provided error bounds on virtual reality lens distortion correction, with applications to varifocal head-mounted displays to mitigate the vergence-accommodation conflict.
- Responsibilities: experiment design, implementation/debugging, participant running, and data analysis.

- Designed and conducted psychophysical experiments to measure users' tolerance of horizontal visual gains with visual distractions present during locomotion in VR using an HTC Vive.
- Developed a physically-based, haptic buoyancy simulation to render properties of buoyancy under different material properties using Unity and a Novint Falcon controller.

PUBLICATIONS & INVITED TALKS

A full list of my publications can be found on my [Google Scholar profile](#). * denotes equal contribution.

Journal Papers

- [J.1] MR Saeedpour-Parizi, **NL Williams**, T Wong, P Guan, D Manocha, IM Erkelens. Perceptual Thresholds for Radial Optic Flow Distortion in Near-Eye Stereoscopic Displays. *IEEE Transactions on Visualization and Computer Graphics*, 2024 (Proc. IEEE VR 2024) (12.6% acceptance rate) [\[link\]](#)
- [J.2] **NL Williams**, A Bera, D Manocha. Redirected Walking in Static and Dynamic Scenes Using Visibility Polygons. *IEEE Transactions on Visualization and Computer Graphics*, 2021 (Proc. IEEE ISMAR 2021) (19.7% acceptance rate) **[Best paper honorable mention]** [\[link\]](#)
- [J.3] **NL Williams**, A Bera, D Manocha. ARC: Alignment-based Redirection Controller for Redirected Walking in Complex Environments. *IEEE Transactions on Visualization and Computer Graphics*, 2021 (Proc. IEEE VR 2021) (15.5% acceptance rate) **[Best paper honorable mention]** [\[link\]](#)
- [J.4] **NL Williams** and TC Peck. Estimation of Rotation Gain Thresholds Considering FOV, Gender, and Distractors. *IEEE Transactions on Visualization and Computer Graphics*, 2019 (Proc. IEEE ISMAR 2019) (8.6% acceptance rate) [\[link\]](#)

Conference Papers

- [C.1] **NL Williams***, N Rewkowski*, J Li, MC Lin. A Framework for Active Haptic Guidance Using Robotic Haptic Proxies. *IEEE International Conference on Robotics and Automation*, 2023 (43.04% acceptance rate) [\[link\]](#)
- [C.2] **NL Williams**, A Bera, D Manocha. ENI: Quantifying Environment Compatibility for Natural Walking in Virtual Reality. *IEEE Conference on Virtual Reality and 3D User Interfaces (VR)*, 2022 (20.5% acceptance rate) **[Best paper honorable mention]** [\[link\]](#)
- [C.3] JK Terry, B Black, M Jakakumar, A Hari, R Sullivan, L Santos, C Dieffendahl, **NL Williams**, Y Lokesh, C Horsch, P Ravi. PettingZoo: Gym for Multi-Agent Reinforcement Learning. *Neural Information Processing Systems (NeurIPS)*, 2021 (26% acceptance rate) [\[link\]](#)
- [C.4] U Bhattacharya, N Rewkowski, P Guhan, **NL Williams**, T Mittal, A Bera, D Manocha. Generating Emotive Gaits for Virtual Agents Using Affect-Based Autoregression. *IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*, 2020 (22.8% acceptance rate) [\[link\]](#)

Workshop Papers and Posters

- [P.1] **NL Williams**, A Bera, D Manocha. Redirection Using Alignment. *IEEE VR 2021 Locomotion Workshop*, 2021
- [P.2] K Qi, D Borland, E Jackson, **NL Williams**, J Minogue, and TC Peck. The impact of haptic and visual feedback on teaching. *IEEE Conference on Virtual Reality and 3D User Interfaces (VR)*, 2020
- [P.3] K Qi, D Borland, **NL Williams**, E Jackson, J Minogue, and TC Peck. Augmenting Physics Education with Haptic and Visual Feedback. *IEEE VR 2020 Fifth Workshop on K-12+ Embodied Learning through Virtual & Augmented Reality (KELVAR)*, 2020
- [P.4] J Minogue, D Borland, TC Peck, E Jackson, K Qi, and **NL Williams**. Tracing the development of a haptically-enabled science simulation (hesss) for buoyancy. *NARST Annual International Conference*, 2020

[P.5] **N Williams** and TC Peck. Estimation of rotation gain thresholds for redirected walking considering fov and gender. *IEEE Conference on Virtual Reality and 3D User Interfaces (VR)*, 2019

Invited Talks

[T.1] Methods for Natural Walking in Virtual Reality,
Research Seminar - Master in Robotics, Graphics and Computer Vision, Universidad de Zaragoza, 2024.
[\[link\]](#)

[T.2] ARC: Alignment-based Redirection Controller for Redirected Walking in Complex Environments,
SIGGRAPH 2021 TVCG Session on VR, SIGGRAPH 2021. [\[link\]](#)

[T.3] Measuring Perceptual Limits of Redirected Walking in Virtual Reality,
Davidson College Coffee Talk, Davidson College, NC, 2018.

TEACHING EXPERIENCE

Computer Science Teaching Assistant

University of Maryland, College Park

Aug 2019 - May 2023

College Park, MD

- Held office hours, designed programming assignments, and graded assignments and exams.
- Delivered lectures for students when the professor was unavailable.
- Head TA for “Advances in Extended Reality” course.
- *Courses TA'd for:* Advances in Extended Reality, Advanced Data Structures, Game Programming, Bioinformatic Algorithms

Stanford Code In Place Online Section Leader (Volunteer)

Stanford University Computer Science Department

April 2020 - May 2020

Online

- Code In Place was a 5-week online introductory course on programming offered by Stanford University during the COVID-19 pandemic, aimed at teaching people a new skill during lockdown. All participation was voluntary.
- Led weekly review sessions and held office hours for 10 people in the course.

Head Computer Science Teaching Assistant

Davidson College Mathematics & Computer Science Department

Jan 2019 - May 2019

Davidson, NC

- Coordinated shift scheduling for all computer science TAs.
- Liaised with TAs, graders, and professors to resolve problems throughout the semester.
- Worked with the department to create a more structured environment for future graders and TAs.

Computer Science Tutor

Davidson College Center for Teaching & Learning

Aug 2018 - May 2019

Davidson, NC

- Assisted students in learning new programming languages, troubleshooting bugs, and understanding introductory computer science concepts.
- Helped students develop an independent thinking style through open-ended questions.
- *Courses tutored:* Programming and Problem Solving, Discrete Structures, Data Structures, Computer Organization, Bioinformatics Programming.

Computer Science Grader

Davidson College Mathematics & Computer Science Department

Aug 2017 - Dec 2018

Davidson, NC

- Graded and provided feedback on assignments for 20 - 40 students per semester. Feedback included optimization, debugging, implementations of different data structures, and cleanliness.

MENTORING EXPERIENCE

Undergraduate Students: Logan Stevens (2021–Present), Benjamin Margolis (2023–Present), Daniel Lopez (2023–2024), Jason Alexander Fotso-Puepi (2022–2023)

SKILLS

Computing Skills	C++, Python, C#, R, Unity3D, Unreal Engine, PsychoPy, D3.js, git, L ^A T _E X, Windows, Linux
Research Areas	Virtual/augmented reality, visual perception, motion perception, psychophysics, human-computer interaction, human locomotion & navigation, motion planning, statistical modeling, computational geometry, computer graphics, user interfaces

MEDIA COVERAGE

- *Graduate Student Niall Williams Awarded Link Foundation Fellowship - UMD CS*
Link: <https://www.cs.umd.edu/article/2022/06/graduate-student-niall-williams-awarded...>
- *This New Algorithm Lets You Explore Virtual Reality by Walking Naturally - UMIACS*
Link: <https://www.umiacs.umd.edu/about-us/news/new-algorithm-lets-you-explore...>
- *Graduate Student Niall Williams Awarded Honorable Mention, Best Paper at 2022 IEEE VR - UMD CS*
Link: <https://www.cs.umd.edu/article/2022/03/graduate-student-niall-williams-awarded...>

PROFESSIONAL SERVICE & COMMUNITY INVOLVEMENT

Program Committee	<u>SIGGRAPH History Committee</u>	2023 - Present
	<u>IEEE VR Future Faculty Forum Chair</u>	2024
	<u>IEEE ISMAR Future Faculty Forum Chair</u>	2023
	<u>SIGGRAPH Research Career Development Committee</u>	2021 - 2023
Peer Reviewing	IEEE TVCG (2021 - present)	8 reviews
	IEEE VR (2020 - present)	22 reviews
	IEEE ISMAR (2021 - present)	14 reviews
	ACM SIGGRAPH North America & Asia (2022 - present)	5 reviews
	ACM VRST (2023)	2 reviews
	IEEE Transactions on Games (2021)	1 review
	MobileHCI (2021)	1 review
	ACM CHI (2022)	1 review
Student Volunteer	IEEE VR (2020, 2021)	
	IEEE ISMAR (2019)	
University of Maryland	<u>GAMMA Lab Twitter account admin</u>	2023 - Present
	Graduate admissions application reviewer	2019 - Present
	<u>Girls Talk Math</u> summer camp problem set reviewer	2021
	Graduate school application mentor	2020
Davidson College	Math & CS department student representative	2018 - 2019
	Davidson College ACM chapter co-founder	2018 - 2019