Niall L. Williams

8125 Paint Branch Dr, College Park, MD 20740
niallw@umd.edu ◇ niallw.github.io ◇ +1 347-335-4330

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 (in relation to 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 interdependent 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.

DRIVE Lab, Davidson College Davidson, NC USA
Research Assistant (Advisor: **Tabitha C. Peck**) *May 2018 - Aug 2019*

- 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)

[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] ARC: Alignment-based Redirection Controller for Redirected Walking in Complex Environments, *SIGGRAPH 2021 TVCG Session on VR*, SIGGRAPH 2021. [link]

[T.2] Measuring Perceptual Limits of Redirected Walking in Virtual Reality, *Davidson College Coffee Talk*, Davidson College, NC, 2018.

TEACHING EXPERIENCE

Computer Science Teaching Assistant Aug 2019 - May 2023
University of Maryland, College Park *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) April 2020 - May 2020
Stanford University Computer Science Department *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 Jan 2019 - May 2019
Davidson College Mathematics & Computer Science Department *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 Aug 2018 - May 2019
Davidson College Center for Teaching & Learning *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 Aug 2017 - Dec 2018
Davidson College Mathematics & Computer Science Department *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, LaTeX, 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	SIGGRAPH History Committee	2023 - Present
	SIGGRAPH Research Career Development Committee	2021 - 2023
Peer Reviewing	IEEE TVCG (2021 - present), IEEE VR (2020 - present), IEEE ISMAR (2021 - present), ACM SIGGRAPH (2022 - present), IEEE Trans. on Games (2021), MobileHCI (2021), ACM CHI (2022)	
Student Volunteer	IEEE VR (2020, 2021), IEEE ISMAR (2019)	
University of Maryland	GAMMA Lab Twitter account admin	2023 - Present
	Graduate admissions application reviewer	2019 - Present
	Girls Talk Math 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