Niall L. Williams

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EDUCATION

University of Maryland, College Park, MD, USA — Aug 2019 - Present
PhD in Computer Science (MS expected Dec 2021), 3.76 GPA
– Research interests: Virtual/Augmented reality, visual perception, human-computer interaction, robotics
– Advisors: Dr. Dinesh Manocha & 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	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, Aniket Bera**) — *Aug 2019 - Present*

- Developing VR locomotion interfaces, using spatial computing and motion planning with the Oculus Quest, that minimize the chance of collision with physical objects to improve immersion in VR experiences.
- Exploring the use of adaptive sampling in psychophysics and physiological signals to efficiently estimate to what degree users tolerate visual motion gains during locomotion in virtual reality.
- Developing active haptic interfaces that utilize mobile robots to provide online 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.

Applied Perception Science Team, Meta Reality Labs — Redmond, WA USA
Research Scientist Intern (Advisors: **Ian Erkelens, Phil Guan**) — *May 2022 - Aug 2022*

- Conducted research on human perception sensitivity to visual stimuli. Worked in a cross-functional team with vision scientists and engineers.
- Responsibilities included experiment design, implementation, 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

Under Review

[R.1] **NL Williams**, J Li, MC Lin. A Framework for Active Haptic Guidance Using Robotic Haptic Proxies. *IEEE International Conference on Robotics and Automation*, 2023 [link]

Journal Papers

[J.1] **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.2] **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.3] **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**, 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.2] 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.3] 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.

Software

[S.1] Pasumi: Open-source library for simulating virtual reality locomotion using redirected walking. https://pasumi.github.io/

TEACHING EXPERIENCE

Computer Science Teaching Assistant Aug 2019 - May 2022
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.
- **Courses TA'd for:** Advances in XR, 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 TA 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 any 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 peers in learning new programming languages, troubleshooting bugs and understanding introductory computer science concepts.
- Guided peers toward developing 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.
- Wrote a script to automate grading for a new homework assignment.

MENTORING EXPERIENCE

Undergraduate Students: Logan Stevens (2021-Present), Jason Alexander Fotso-Puepi (2022-Present)

SKILLS

Computing Skills	C++, Python, C#, R, Unity3D, D3.js, git, LaTeX, Windows, Linux
Subjects	Virtual/augmented reality, visual 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 Research Career Development Committee	2021 - Present
Peer Reviewing	IEEE TVCG (2021 - present), IEEE VR (2020 - present), IEEE ISMAR (2021), ACM SIGGRAPH (2022), IEEE Trans. on Games (2021), MobileHCI (2021), ACM CHI (2022)	
Student Volunteer	IEEE VR (2020, 2021), IEEE ISMAR (2019)	
University of Maryland	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