Niall L. Williams

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EDUCATION

University of Maryland, College Park, MD, USA — Aug 2019 - Dec 2024
PhD in Computer Science, 3.81 GPA (Dec. 2024)
MS in Computer Science (Dec. 2023)
– Research interests: Virtual/Augmented Reality, Human Perception & Navigation, Computer Graphics, Robotics
– Dissertation Title: Computational Methods for Natural Walking in Virtual Reality
– 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

New York University Tandon CSE Faculty Fellow	March 2024
University of Minnesota President's Postdoctoral Fellowship (declined)	March 2024
Bucknell University Aspiring Primarily Undergraduate Institution Faculty Workshop	Sept 2023
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

EMPLOYMENT & RESEARCH EXPERIENCE

New York University Tandon School of Engineering — New York, NY USA
Faculty Fellow (Computer Science & Engineering) — *Sept 2024 - Present*

- Instructor of record for CS-GY 6313 B: Information Visualization. Responsibilities include preparing and delivering weekly lectures, designing programming assignments and a final project, organizing guest lectures, and holding office hours for 50 students.

Immersive Computing Lab, New York University Tandon CSE — New York, NY USA
Postdoctoral Researcher (Advisor: **Qi Sun**) — *Sept 2024 - Present*

- Conducting research on applied human perception for augmented/virtual reality and computer graphics.
- Mentoring junior PhD students on how to develop research questions and complete research projects.

GAMMA Lab, University of Maryland — College Park, MD USA
Research Assistant (Advisors: **Dinesh Manocha, Ming C. Lin, Aniket Bera**) — *Aug 2019 - Aug 2024*

- Developed VR locomotion interfaces, using spatial computing, motion planning, and eye tracking, that aimed to minimize the chance of collision with physical objects to improve immersion in VR experiences.
- Studied 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 (Managers: **Ruth Rosenholtz, Jaehyun Jung**) — *Jan 2024 - Aug 2024*

- Studied how accurately humans can estimate the gaze direction of digital human avatars, with applications to video teleconferencing and telepresence technologies.
- Studied how different interfaces for viewing and comparing videos affect people's eye movements and accuracy in locating artifacts in videos, with applications to image/video quality assessment.
- Responsibilities: Experiment design and implementation, participant running, and data analysis.

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.

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.
- Contributed to development of 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 (HESS) 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] Perception of Motion Artifacts in Near-Eye Varifocal Displays,
UMD Computer Vision Seminar, University of Maryland, 2024. [link]

[T.2] Methods for Natural Walking in Virtual Reality,
Research Seminar - MS in Robotics, Graphics and Computer Vision, Universidad de Zaragoza, 2024. [link]

[T.3] ARC: Alignment-based Redirection Controller for Redirected Walking in Complex Environments,
SIGGRAPH 2021 TVCG Session on VR, SIGGRAPH 2021. [link]

[T.4] 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 2024
University of Maryland, College Park *College Park, MD*

- Held office hours, designed programming assignments, and graded assignments and exams.
- Created and delivered lectures.
- Head TA for "Advances in Extended Reality" course.
- **Courses TA'ed:** Advances in Extended Reality (3×), Advanced Data Structures (3×), Game Programming (2×), Bioinformatic Algorithms (1×)

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 by asking 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 (now: MS student at UMD)	2021 - Present
	Benjamin Margolin	2023 - 2024
	Daniel Lopez (now: PhD student at UCSB)	2023 - 2024
	Jason Alexander Fotso-Puepi (now: PhD student at Purdue)	2022 - 2023

PROFESSIONAL SERVICE & COMMUNITY INVOLVEMENT

Program Committee	SIGGRAPH History Committee	2023 - Present
	IEEE ISMAR Future Faculty Forum Chair	2024
	IEEE VR Future Faculty Forum Chair	2024
	IEEE ISMAR Future Faculty Forum Chair	2023
	SIGGRAPH Research Career Development Committee	2021 - 2023
Peer Reviewing	IEEE Trans. on Visualization & Computer Graphics (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
	ACM Transactions on Applied Perception (2024 - present)	1 review
	PRESENCE: Virtual and Augmented Reality (2024)	1 review
	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	GAMMA Lab Twitter account admin	2023 - Present
	Graduate admissions application reviewer	2019 - 2024
	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

SKILLS

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

MEDIA COVERAGE

- *New Faculty at NYU Tandon CSE* - ***NYU***
  Link: https://engineering.nyu.edu/news/new-faculty-fall-2024#Niall
- *This computer scientist is making virtual reality safer* - ***Science News Explores***
  Link: https://www.snexplores.org/article/computer-scientist-safer-virtual-reality
- *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...