

James Mullen

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Research Interests	Human-robot interaction, Virtual and augmented reality, Embodied AI, operationalized AI, image/video synthesis.	
Education	UNIVERSITY OF MARYLAND	2021-2026 (Expected)
	Ph.D. in Computer Science Advised by Dinesh Manocha and Ming Lin in GAMMA Lab	
	VIRGINIA TECH	2017-2021
	B.S in Mechanical Engineering, Computer Science Minor 3.91 GPA	
Experience	UNIVERSITY OF MARYLAND	2021-Present
	NSF Fellow and Graduate Research Assistant	
	Human Animation Placement	
	· Designed PAAK, a method to <i>place 3D human animations into an arbitrary scene</i> such that interactions with the scene are maintained using an autoencoder, scene geometry, and active learning techniques	
	· For example, if the animation involves sitting or touching an object, PAAK places the human into the scene such that it is sitting in a chair or touching an object	
	· Conducted a user study to test the perceived realism of the scene placements	
	· Research resulted in a first author publication at IEEE/CVF WACV	
	· Follow up work tailors the animations to the geometry of the scene, resulting in even more natural-looking scene placements – work under review	
	Virtual Reality for Characterizing Driver Behavior	
	· Developed a system for collecting human driving data in pre-crash scenarios to model human behavior	
	Embodied AI	
	· Conducting research tackling the robot instruction-following problem in a generalized zero-shot setting	
	RAYTHEON	2018-2021
	AI Research Intern & Principal Investigator	
	Advisor: Dr. Philip Sallee	

Computer Vision Research Projects

- Initiated a research proposal, then ran and completed a research project exploring connections between imagery annotation types and neural network performance
- Research resulted in granted **U.S. Patent No. 11,068,747 [5]**, and a **publication at the IEEE Conference on Computer Vision and Pattern Recognition [2]**
- Pitched and secured funding as Principal Investigator to develop novel probabilistic pseudo-annotations for achieving state-of-the-art detection results on cheaply annotated data, **Patent Application #16/586480 [5]** filed
- Designed and implemented a new, clustering-based method of hardening neural networks against out of distribution data, data drift, and adversarial attacks in a focus to operationalize AI, **Patent Application #17/081612 [3]** filed

Innovation Center Research Project

- Developed a grant proposal and pitched to a panel of 7 research and business executives, selected for funding from over 100 applicants
- Directed execution including tracking funds, managing the team, developing business interest, and filing **Patent Application #16/745885 [4]**
- Postulated a unique approach to course of action planning using 'costmaps' and AI

VIRGINIA TECH

Undergraduate Research

Advisor: Dr. Brain Lattimer, Dr. Dylan Losey

[Communicating Robot Learning \(Dr. Losey\)](#) 2020-2021

- Designing methods to gather information from a robot as it learns, and present said information to a human intuitively through haptic and AR feedback devices
- Designed and conducted a user study to evaluate our multi-modality method against single-modality baselines
- Resulted in a publication at **IEEE Robotics and Automation Letters [1]**
- Wrote VT ME Grant application and was awarded funding for the project

[Satellite Imagery Super-Resolution \(Dr. Lattimer\)](#) 2019-2021

- Explored a super-resolution of GOES Imagery to VIIRS-I Imagery to produce high resolution, frequent imagery for use in wildland fire burn map creation
- Wrote VSGC Fellowship application and was awarded funding for the project

Refereed Conference Proceedings and Journal Articles

1. **James F. Mullen Jr.**, Divya Kothandaraman, Aniket Bera, and Dinesh Manocha, "Placing Human Animations into 3D Scenes by Learning Interaction- and Geometry-Driven Keyframes," *IEEE/CVF Winter Conference on the Applications of Computer Vision (WACV)*, 2023
2. **J. F. Mullen**, J. Mosier, S. Chakrabarti, A. Chen, T. White and D. P. Losey, "Communicating Inferred Goals With Passive Augmented Reality and Active

Haptic Feedback," in IEEE Robotics and Automation Letters, vol. 6, no. 4, pp. 8522-8529, Oct. 2021, doi: 10.1109/LRA.2021.3111055.

3. **James F. Mullen Jr.**, Franklin R. Tanner, and Philip A. Sallee, "Comparing the Effects of Annotation Type on Machine Learning Detection Performance," *IEEE Conference on Computer Vision and Pattern Recognition Workshops (CVPR)*, 2019.

Patents

4. Philip A. Sallee, **James F. Mullen Jr.**, "Hardening Deep Neural Networks," *US Patent Application 17/081612*, 2020.
5. **James F. Mullen Jr.** and Rupal Nigam, "Systems and Methods for Multi-Factor Pathfinding," *US Patent Application 16/745885*, 2020.
6. **James F. Mullen Jr.**, Jon Goldstein, Philip A. Sallee, and Franklin R. Tanner, "A Training Schema for Extended Object Detection with Point-Wise Labels," *US Patent Application 16/586480*, 2019.
7. Philip A. Sallee, **James F. Mullen Jr.**, and Franklin R. Tanner, "Machine Learning Using Informed Pseudolabels" (U.S. Patent No. 11,068,747). U.S. Patent and Trademark Office. (2021)

Honors & Awards

National Science Foundation Graduate Research Fellowship	2022
Raytheon AI/ML Scholars Award	2020
Virginia Tech Mechanical Engineering Grant	2020
Virginia Space Grant Consortium (VSGC) Fellowship	2020
Raytheon Innovation Grant (x2)	2018 & 2019
Raytheon Achievement Award (x2)	2018 & 2019
Edward H. Cahill Memorial Scholarship	2019
Pratt Engineering Scholarship	2018

Outreach

Montgomery County Animal Shelter Volunteer	2019 to Present
Eagle Scout	2015