Nicholas Harrell

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EDUCATION

University of Maryland, Baltimore County (UMBC)   *May 2025*
Baltimore, Maryland
    BS in Computer Engineering - 3.90 GPA
    BA in Mathematics - 3.92 GPA

RESEARCH EXPERIENCE

Johns Hopkins University Terradynamics Lab   *May 2024 - August 2024*
Analysis of Human Speed Climbing from a Monocular Video Perspective – Baltimore, Maryland
- Trained a custom Yolov8 model to identify climbing wall anchors from speed climbing videos
- Eliminated perspective warping using image transformation of anchors to ensure steady scaling
- Tracked and extracted human pose using OpenPose for analysis of performance through the climb

UMBC Center for Real-time Distributed Sensing and Autonomy   *June 2023 - August 2023*
Mobile Collaborative Robotics - AirDrop – Baltimore, Maryland
- Classified terrain to enhance mobile robot path planning using OpenCV and an image segmentation model
- Developed a custom A* algorithm to increase the efficiency of traversal, adjusting to agent and environmental factors
- Employed a Raspberry Pi and IMU to enable accurate autonomous navigation using an Extended Kalman Filter

Blue Wave Semiconductors   *January 2022 - December 2022*
Semiconductor Synthesization for Extreme Use Cases – Baltimore, Maryland
- Created a program with Python and Pandas, validating that a synthesized semiconductor follows the principles of an ideal diode for production quality control
- Produced nanocrystalline diamond coatings using a NIRIM-type reactor for use cases that require extreme heat, precision, or durability
- Created a program using Python, Pandas, and Matplotlib that visualizes oscilloscope data for quick analysis and data processing

Virginia Tech AIRFlowS Lab   *May 2022 - July 2022*
Emission and Deposition of Atmospheric Microplastics – Blacksburg, Virginia
- Developed atmospheric back trajectories using NOAA HYSPLIT to determine possible origins of microplastics
- Analyzed and scanned collected data samples using an electronic microscope to measure plastic deposition levels
- Scanned deposition compositions using Raman Spectroscopy to identify microplastics

TEACHING EXPERIENCE

UMBC Computer Engineering Department   *January 2024 - May 2025*
    Teaching Assistant - Baltimore, Maryland
- Run laboratory sections for students to assemble circuits and effectively collect data in a hands-on environment using an oscilloscope, function generator, and multimeter
- Facilitate learning of fundamental circuits such as the voltage/current divider, integrator, differentiator, and filter circuits, and their applications

UMBC Computer Science Department   *January 2023 - May 2025*
    Teaching Fellow - Baltimore, Maryland
- Host office hours and study sessions for computer science students with C++ topics and assignments involving dynamic memory, polymorphism, containers, and recursion
- Develop lab assignments, projects, and project solutions with other teaching fellows that target important topics in object-oriented programming to enhance student learning

UMBC Physics Department   *August 2022 - December 2022*
    Learning Assistant - Baltimore, Maryland
- Guided students' learning of Introductory Calculus-Based Physics 2 topics by answering questions in a discussion class environment about the assigned content
- Met weekly with other learning assistants to review teaching content and set goals for next week's discussions

PROFESSIONAL EXPERIENCE
Clearhaven Technologies   *September 2020 - April 2021*
    Student Intern - Severna Park, Maryland
- Developed security and data management programs using AWS Cloud 9 IDE and renovated the existing website using HTML, CSS, and JavaScript
- Created documentation on the NVIDIA Jetson Nano and AWS technologies to educate users unfamiliar with the Internet of Things

DreamPort of Maryland Innovation & Security Institute   *July 2019 - August 2019*
    Student Intern - Columbia, Maryland
- Developed AI/ML facial recognition software using Python, OpenCV, Ubuntu, and git to reduce office intern check-in time
- Researched and presented an infrastructure plan for a small government contractor with FedRamp-level security
- Created a website using HTML, CSS, and JavaScript associated with NFC tags to inform Dreamport visitors about important cybersecurity topics and leaders

INVOLVEMENT
    President - Institute of Electrical and Electronics Engineers (IEEE)   *May 2023 - May 2025*
Produce professional, technical, and academic workshops related to the electronics industry

    Initiation Chair - Tau Beta Pi Engineering Honor Society (TBP)   *May 2024 - May 2025*
Manage the initiation process, including engaging with new and prospective members

Membership:

Pi Mu Epsilon - Mathematics Honor Society	Association for Computing Machinery
Mu Sigma Rho - Statistics Honor Society	National Society of Black Engineers

VOLUNTEER EXPERIENCE
English Conversation Partner   *August 2023 - May 2025*
    UMBC English Language Institute - Baltimore, Maryland
- Meet weekly with non-native English speakers to develop conversational skills and share culture

Peer Advisor   *August 2023 - Present*
    Meyerhoff Scholars Program - Baltimore, Maryland
- Mentoring 8 Meyerhoff scholars by offering guidance with academic, research, and career goals.

Student Tutor *August 2021 - May 2022*
    STEMcx - Baltimore, Maryland
- Tutored historically underrepresented students weekly from the Baltimore area to foster a strong STEM foundation

PROJECTS - **github.com/metrix745**

3D Haptic Vest for Enhanced Audio Perception *August 2024 - Present*
- Engineering a real-time audio processing pipeline using techniques such as Short-Time Fourier Transform (STFT) to convert stereo audio into spatially accurate haptic feedback
- Implemented noise filtration algorithms to isolate critical audio signals, such as alarms or footsteps, and suppress ambient noise for enhanced feedback precision
- Developed a Convolution Neural Network trained on the ESC-50 and CIPIC HRIR datasets to accurately separate audio signals, classify audio sources, and determine the direction of the source in a 2-dimensional format from a stereo audio clip

HackUMBC *September 2024*
    Major League Hacking - https://github.com/Metrix745/GradFinder
- Developed Lab Finder, an app that identifies Principal Investigators on campus who overlap with student research interests
- Utilized web scraping APIs to extract titles and abstracts of the 20 most recent papers to construct a profile of the recent work for each researcher
- Performed an elastic search to match student interests to researchers and their projects

UMD Bitcamp - https://github.com/Metrix745/exploreMaps *April 2023*
    Major League Hacking - College Park, Maryland
- Participated in UMD's hackathon, developing a program that takes in points of interest from a map and creates efficient walkways between each point

AWARDS AND HONORS

University of Illinois, Urbana-Champaign MERGE Scholar *September 2024*
Selected to attend UIUC's MERGE program to learn more about their programs in the Grainger College of Engineering and network with faculty from the ECE department

Tau Beta Pi Scholar *August 2024*
Selected by the Engineering Honor Society to receive funding based on campus leadership, service, and promise of future contributions to the engineering profession (253/1328)

Georgia Tech FOCUS Scholar *January 2024*
Selected to visit Georgia Tech to learn more about their graduate programs and connect with faculty and staff from academic units and research laboratories

UMBC President's List *2022, 2023*
Maintained a 4.0 GPA through the academic year

Google Computer Science Research Program *February 2022*
Selected for mentorship from Google Brain Researchers to develop personal research skills

UMBC Meyerhoff Scholar *August 2021*
Selected for the Meyerhoff Scholars Program's 33rd cohort to pursue a PhD in STEM