# Michael Evans

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## EDUCATION

**Old Dominion University**, Norfolk, VA, United States — Sept 2023-May 2025
Bachelor of Science in Computer Science
GPA: 3.92/4.00

**Tidewater Community College**, Portsmouth, VA, United States
Associate of Science in Computer Science — Jan 2020-May 2023
Associate of Science in Business Administration — Aug 2017-May 2019
GPA: 3.96/4.00

## PUBLICATIONS

### Conference Proceedings

**Michael Evans**, Dominik Soós, Ethan Landers, and Jian Wu. 2023. MSVEC: A Multidomain Testing Dataset for Scientific Claim Verification. In *The Twenty-fourth International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing (MobiHoc '23), October 23–26, 2023, Washington, DC, USA.* ACM, New York, NY, USA, 6 pages. https://doi.org/10.1145/3565287.3617630 [Paper]

### Preprints

**M. Evans**, M. Machado, R. Johnson, L. Escamilla, A. Vadella, B. Froemming-Aldanondo, T. Rastoskueva, M. Jostes, D. Butani, R. Kaddis, C. Chung, and J. Siegel. 2024. Vehicle-to-Everything (V2X) Communication: A Roadside Unit for Adaptive Intersection Control of Autonomous Electric Vehicles [ICRA 2025, in review] [Paper]

B. Froemming-Aldanondo, T. Rastoskueva, **M. Evans**, M. Machado, A. Vadella, L. Escamilla, R. Johnson, M. Jostes, D. Butani, R. Kaddis, C. Chung, and J. Siegel. 2024. Developing, Analyzing, and Evaluating Self-Drive Algorithms Using Drive-by-Wire Autonomous Vehicles [ICRA 2025, in review] [Paper]

## TALKS

**Robust Lane Following with V2X Traffic Management**
Research Experience for Undergraduates in Developing Self-Drive Algorithms for Electric Vehicles, Lawrence Technological University, 2024 (REU '24).

**The Potential of Large Language Models in Evaluating Scientific Claims**
Undergraduate Research Symposium; 2024 Mar 30; Norfolk, Virginia (VA): ODU Digital Commons (URS '24).

**MSVEC: A Multidomain Testing Dataset for Scientific Claim Verification**
The Twenty-fourth International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing (MobiHoc '23).

**Scientific News Verification With GPT**
Research Experience for Undergraduates in Disinformation Detection and Analytics, Old Dominion University, 2023 (REU '23).

## RESEARCH EXPERIENCE

**Undergraduate Research Assistant** — Sept 2024-Present
ODU Vision Lab, advised by Dr. Khan Iftekharuddin

- Applied transfer learning to the VGG16 convolutional neural network (CNN) for target identification with a surveillance robot capable of identifying, tracking, and following individuals with PyTorch.

- Fine-tuned the motion planning algorithm in MATLAB for target following through tight, cluttered environments, enabling safe indoor operation previously limited to outdoor use.

**NSF REU Intern - Developing Self-Drive Algorithms for Electric Vehicles** May-July 2024
Lawrence Tech and Michigan State University, advised by Dr. Chung and Dr. Siegel
Computer Science & Artificial Intelligence Robotics Lab

- First-authored *Vehicle-to-Everything (V2X) Communication: A Roadside Unit for Adaptive Intersection Control of Autonomous Electric Vehicles* as the lead researcher on a team of 7 undergraduates.
- Formulated an adaptive speed algorithm to reduce acceleration and braking by up to 75.35% for minimizing fuel consumption, and developed robust self-driving algorithms using ROS, OpenCV, and Scikit-learn.
- Assembled a V2X wireless communication architecture with a roadside unit capable of dynamically adjusting vehicle speed in response to traffic states, and deployed an Arduino-powered traffic light for visualization.

**NSF REU Intern - Disinformation Detection and Analytics** June-Aug 2023
Old Dominion University, advised by Dr. Jian Wu
Lab for Applied Machine Learning and Natural Language Processing Systems

- Wrote *MSVEC: A Multidomain Testing Dataset for Scientific Claim Verification* as the first author.
- Conducted prompt engineering with hyperparameter tuning and expanded the project corpus from 56 to 200 data points for testing the effectiveness of the GPT-3.5-turbo model on generalizing to multiple domains.
- Calculated the precision, recall, and F1 score on zero-shot classification with the GPT-3.5-turbo model against the MSVEC dataset on two sub-tasks: stance labeling and identifying sentence rationales.

## PROFESSIONAL EXPERIENCE

**Junior PHP Web Developer** Dec 2021-June 2022
Hard to Find Party Supplies

- Collaborated with the director of IT to build and maintain $1m/year eCommerce platform by performing server maintenance, writing documentation, designing web page features, managing Google AD campaigns and updating inventory of 35,000 products weekly.
- Revised XML web page modifications from PHP to TWIG during a complete server rework while utilizing the MVC design pattern, CSS, and HTML.
- Optimized legacy inventory processes with the use of CRON jobs to save 30 minutes of work time per week for current and future developers.
- Shaped the site Admin page by writing quality-of-life features for back-end users and setup network for secondary location during business expansion.

## CERTIFICATIONS

**CITI Program** July 2023
Social and Behavioral Research - Basic/Refresher
Social and Behavioral Responsible Conduct of Research
Responsible Conduct of Research for Engineers

## AWARDS

College of Sciences Dean's List – Old Dominion University Dec 2023-May 2024
BIO, GEO, CISE and OCE REU Travel Grant – $1,200 Sept 2023
Academic Excellence Award – Tidewater Community College April 2020, Mar 2023

## PROFESSIONAL SERVICE

Intelligent Ground Vehicle Competition (IGVC), *Surveyor* Jun 2024
University Accountability Board, *Member* March-Aug 2024
Association for Computing Machinery Group at ODU, *Member* Jan 2024-Present
STEM Day Expo, Wilson High School, *Volunteer Exhibitor* March 2019
National Mathematics Honor Society at TCC (MAΘ), *Member* Feb 2019-Present

# Statement of Purpose

**Introduction.** My research interest focuses on the intersection of robot learning and planning, autonomous navigation, and natural language processing (NLP). While contemporary task and motion planning (TAMP) techniques have made remarkable progress in recent years, there are still prevalent challenges in reliably adapting to complex environments. This difficulty restricts many modern learning methods to simulation or immutable real-world tasks. Vital to overcoming such deficiencies is the ability to apply causal reasoning during the learning process, something that human-intelligence and language naturally facilitate. Motivated by these challenges, my research aims to develop intelligent generalist robots capable of integrating into society by incorporating NLP into their learning and planning processes.

**Research in Natural Language Processing.** My first research experience was during an NSF-funded Research Experience for Undergraduates (REU) at Old Dominion University (ODU). With limited research opportunities available at my community college, I was ecstatic to begin researching before taking my first university-level computer science course. While I acknowledged that acquiring relevant research experience in my position would be more challenging than in a traditional university setting, I was able to overcome this barrier through actively seeking outside opportunities. The objective of this project was to evaluate the capabilities of large language models (LLMs) on the task of scientific claim verification (SCV). Prompted by the recent increase of disinformation in scientific news, we proposed a robust and generalizable solution to automated SCV. Our experiments explored if the LLM could apply human-like reasoning to discern real news claims from fake claims. To answer this question, I built and tested a dataset consisting of 200 pairs of research papers and scientific news claims across 10 subject domains. The LLM was supplied with a research paper relevant to the claim and asked to determine if the research supported or contradicted the news. Published research should support true news claims and be contradictory to false news claims. I revealed that the model performed better at higher temperatures: a hyperparameter for adjusting the creativity in the model's responses. This experience is highly relevant to my long term research goals, as LLMs can be used for translating natural language commands into actionable tasks through code generation. *This work led to a first-author conference publication and presentation at MobiHoc 2023.*

**Research in Robotics.** An existing interest in artificial intelligence shaped by my research in NLP led me to another NSF-funded REU in the field of robotics. The opportunity to conduct research under the winner of the Lemelson-MIT "Drive it!" award, Dr. Joshua Siegel, and the founder of Robofest, Dr. Chan-Jin Chung, was another influential experience that further reinforced my motivation to pursue a Ph.D. To supplement recent advances made to connected and autonomous vehicles, our goal was to develop a Vehicle-to-Everything (V2X) roadside unit (RSU) for autonomous intersection control. By adapting vehicle speeds in response to traffic light states, we eliminated full stops and idling at red lights. My major contribution was developing the adaptive speed algorithm: the crucial logic for planning the agent's approach to the intersection. At each light change, the RSU sent data to the vehicle controller which adjusted the vehicle's speeds. In effect, this synchronized each agent's approach to the intersection with the green light timings. I implemented GPS waypoints and the Cosine-Haversine formula to plan the vehicle's motion to the intersection. Compared to a human driver, my algorithm reduced the total acceleration and braking through the intersection by 75.35%, which minimizes fuel consumption and noise pollution. *This research led to a first-author conference submission to ICRA 2025, currently under review.* A core requirement for safe and effective autonomous systems is reliable navigation during task performance. Acknowledging this, we

first developed 5 lane-following algorithms to serve as a foundation for our intersection control architecture. We found that lane line detection with the DBSCAN and K-Means machine learning algorithms performed the best for our use case. My significant contribution to this project was in formalizing the simulated environment for safe and efficient testing of complex scenarios before real-world implementation. These algorithms allowed for reliable self-driving up to 3.5 m/s in the outer lane and 2.5 m/s in the inner lane of our testing course. *This work led to a third-author conference submission to ICRA 2025, currently under review.* Following this internship, I joined the ODU Vision Lab as an undergraduate research assistant to further develop my intellectual abilities in autonomous systems. As part of this lab, I have worked on a target-tracking surveillance robot sponsored by the U.S. Army. My work has involved fine-tuning the motion planning algorithm to allow for operation through tight and cluttered environments in our lab. Furthermore, I built a dataset of 2,000 facial images and applied transfer learning to the convolutional neural network VGG16 for target identification with TensorFlow and Keras.

**Goals and Plans.** I am excited to attend Columbia University due to its faculty research that is highly aligned with my research direction. I would be particularly excited to work with Professors Matei Ciocarlie, Hod Lipson, and Carl Vondrick. At CU, I hope to combine my unique experiences in researching human-like intelligence and motion planning to answer the following: **(I)** Can LLM code generation enable runtime task planning when specifying a full behavior policy is not practical? **(II)** How can SLAM techniques be used to augment socially-aware navigation planning in assistive robots? **(III)** Can the proposed generalized task-planning model interface with a socially aware motion-planning model to create a safe and generalizable framework for assistive robots? Instrumental activities of daily living such as shopping, fetching medications or food, and housekeeping for individuals with limited mobility are high-impact applications that could benefit immensely from this work.

Professor Ciocarlie has done inspiring work in the learning domain by introducing reinforcement learning of policies for complex skills, such as precision object grasping. Professor Vondrick's work on discovering biases in large vision-language models is an area of focus similar to my research on human-like reasoning for SCV and is another project that I could bring my unique experiences to. Similarly, I would be excited to contribute to his work on interpretable visual representations, as it combines LLMs with computer vision, both areas of research that I have experience in. Professor Lipson's recent work on aligning AI-driven discovery with human intuition is very closely aligned with my interest in human-like planning with LLMs and attempts to understand state variables without full system knowledge. As my GRFP proposal involved real-time task learning and planning for assistive robots, I would be particularly interested in contributing to his efforts on this project. Continuing my research under their leadership would equip me with a compelling environment for expanding the field of intelligent robotics through learning and planning with human-like intelligence.

In a broad sense, I am fascinated by training robots to learn and perform in complex environments. My long-term goal is to become a Principal Investigator, or lead a research team in industry to solve real-world challenges such as in healthcare, or reducing human exposure to hazardous working environments. Overcoming the challenges of transitioning from a community college to funding my undergraduate studies through a Pell Grant and research has helped me to develop an ability to implement long-term and difficult goals. These qualities are highly correlated to success in graduate school, and I am eager to bring the resilience learned through this unconventional path to enrich CU's community. Attending CU for my Ph.D. will be integral to my success in achieving these goals, and in helping robots learn to help people.