Ngoc Bao Dinh

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Education

University of South Florida - *Tampa, FL* **Expected 05/2028**
Bachelor of Science in Computer Science | **GPA: 4.0/4.0**

- **Relevant Coursework:** Data Structure & Algorithms, Object-Oriented Programming, Data Analysis, Computer Logic Design, Differential Equation, Introduction to Statistics, Computer Organization & Design, Control of Mobile Robots.

Skills

- **Domains**: Computer Vision, Augmented Reality, Human-Robot Interaction, Simulation, Planning, Controls
- **Programming**: C/C++, Python, MatLab
- **Tools**: ROS 1/2, Gazebo, MoveIt, Nav, RViz2, Git, Docker, Solidworks, OpenCV, NumPy, Pandas, Matplotlib, PyTorch
- **Robots & Hardware**: Unitree Go2 quadruped, Fetch Robot, NVidia Jetson Orin NX, Raspberry Pi 5, ESP32, Arduino Mega

Publications

- Evaluating Dynamic Surface Compensation for Robots with Projected AR [Accepted/To appear]
  ACM/IEEE International Conference on Human-Robot Interaction (HRI) Late-Breaking Reports, 2026 [pdf]
  H. Wang, **N. B. Dinh**, Z. Han

Experience

Reality, Autonomy, and Robot Experience (RARE) Lab, USF Tampa, Florida
Junior Undergraduate Researcher III, advised by Prof. Zhao Han **01/2025 – 12/2025**

- Developed a ROS launch file to automate functions - including moving the manipulator on **Fetch** robot with **MoveIt2**, driving the robot to a goal with **Nav2**, and projecting the image, which increased deployment speed by about **30-35%**.
- Developed a speech function as a condition for the evaluation human study by writing **C++** scripts to access the **Unitree Go2**'s speaker through a **Web Real-Time Communication** driver.
- Prepared survey and poster to submit for an **Institutional Review Board (IRB)** consent form for permission to conduct a human study.
- Constructed a "Search & Rescue" test course - based on a collapsed site - from **8** materials to experiment with different image compensation algorithms.

Research Assistant | UR2PhD Research Training Course - CRA Virtual
Mentored by Prof. Zhao Han [certification] [proposal] **01/2025 - 05/2025**

- Wrote a **7-page** proposal to examine potential health concerns of the fog screen system, a spatial augmented reality application, and ways to improve visibility of the screen.
- Designed my LinkedIn and portfolio on GitHub to better present my research interests, future publications, and projects.
- Visualized & cleaned **10+** data points with **NumPy**, **Pandas**, created pots with **Matplotlib**.
- Peer-reviewed other teams' proposals, rebutted to the reviewers, and incorporated feedback into our proposal. Presented our proposal virtually.

Software Student Lead | Foundations of Engineering **08/2024 - 12/2024**

- Implemented a variable speed controller on my Lightning McQueen robot using **Arduino Uno** and **C++**, which reduces the time to complete the track by about **45-50%**.
- Optimized electronics placement and chassis design using **Solidworks** to reduce the weight by about **10%**, therefore reducing the robot's inertia when decelerating at turns.
- Programmed the light sensor to detect when the room is dark to turn on the headlight and make the internal speaker say "Kachow".
- Designed the fins on the chassis near the speaker to increase sound volume and clarity by approximately **40%**.
- Presented our robot as a safe and affordable kit for K-12 students to engage with engineering and programming.

Projects

Pick & Place Manipulator GitHub

- Engineered an autonomous **ROS 2 Jazzy** manipulation system using **MoveIt Task Constructor**, orchestrating a robust **5-stage** pick-and-place pipeline (approach, grasp, lift, move, retreat) capable of handling dynamic tasks.
- Developed a real-time **C++** perception service utilizing the **Point Cloud Library (PCL)** to process depth sensor data, implementing **Region Growing** clustering and **RANSAC** segmentation to isolate objects from the support surface.
- Implemented a geometric shape-fitting algorithm that converts raw 3D point clouds into semantic collision objects (cylinders, boxes) via **Hough Transform** voting, enabling dynamic obstacle avoidance in **Gazebo** environments.

DIY Quadcopter GitHub

- Cleaned real-time data from the accelerometer and gyroscope in MPU6050 with **Kalman filter** to accurately measure the rotation rate of the quadcopter, reducing **95%** of noise.
- Implemented a **PID** control loop to match the measured to the transmitted rotation rate with a reduction of overshooting by **30%** and settling time by **45%**.
- Integrated a high-side power switch (**BTS50080**) to turn off power up to **20 A**, protect the battery from short circuiting, and monitor battery level through a combination of current and voltage measurement.
- Replaced the combination of 5000kV motor - 6A ESC with 4600kV motor - 15A ESC resulted in a **10%** increase in torque to accommodate for payload addition.

Certifications

IBM Data Analyst Professional Certificate | Coursera Certificate

- Handled missing values, formatted, and normalized data from Laptop and Used Car Pricing datasets in **Python**.
- Built different regression models, evaluated if they overfit or underfit, and used ridge regression to prevent overfitting.
- Visualized regression plots with **Seaborn**, geospatial data with **folium**, and other plots using **Matplotlib**.

ROS 2 Moveit 2 - Control a Robotic Arm | Udemy Certificate

- Built launch file to automate running publisher node, controller node, and **RViz2**, saving deployment time by about **30%**.
- Customized my own URDF file to recreate the manipulator in the simulator.
- Attached camera link to see visual feed at the end-effector in **Gazebo**, allowing for future object recognition applications.

Honors & Awards

2nd place, Nasa Space Apps Challenge, 2024

Leadership

Program Committee | USF SASE **09/2024 – 3/2025**

- Coordinated with **30+** students to organize a conference for students to earn insights for industry and graduate studies.
- Hosted a panel with students sharing their experience getting their first internship with **100+** participants.
- Organized a research symposium where **10+** groups came and presented their study to conference participants.

Outreach and Community Engagement

Presenter | USF EE Automation Fest 2025 **09/24/2025**

- Presented the RARE Lab's research project purposes and technical details to a variety of audiences, students, journalists, industry employers, and professors, for **more than 3 hours**.

Planned Spring 2026

Establishing IEEE - Robotics and Automation Society (RAS)

- **Mission**: Provide an entry to robotics for new students and organize professional development programs to support students pursuing industry or research in robotics.
- **Vision**: Make robotics more prominent at USF by organizing useful events and collaborating with other robotics organizations to nurture the community at USF.
- **Plan**: Survey students' interest in robotics at USF and recruit potential board members who want to contribute to the cause. Complete the establishment process in Spring 2026 and begin operation in Fall 2026.