Daniel E. Vinals-Garcia

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Portfolio: *https://vinals-robotics.com/| GitHub: https://github.com/DVinals4721*

EDUCATION

Boston University: Robotics and Autonomous Systems Master's Program: ***GPA: 3.88*** | September 2023 - *May 2025 | Boston, MA*

- Recipient of the Amazon Robotics Day One Fellowship. Master's degree fully funded by Amazon Robotics.
- Relevant Coursework: Deep Learning, Medical Robotics, Precision Machine Design and Instrumentation, Robot Motion Planning, and Computational Mechanics: Nonlinear Analysis and Software Development.

Boston University: Mechanical Engineering| *May 2023 | Boston, MA*

EXPERIENCE

Robotic Mechatronics Design Engineer| *July 2024- April 2025* **| Amazon Robotics***, North Reading, MA*

- Led full-stack robotic arm work cell development for warehouse fulfillment, projected to save billions through automation; designed enclosure fabrication, vision illumination hardware, and ethernet component communication.
- Deployed a robotic solution with a UR10 robotic arm, Zivid point cloud cameras, Robotiq force/torque sensor, closed-loop controllers, and path planning algorithms; conducted research and data analysis for future robotic technologies.
- Designed and fabricated suction-based end effector integrating mechanical, pneumatic, and electrical components; developed eye-to-hand calibration procedures between end effector and point cloud cameras.
- Created computer vision python program using YOLO, OpenCV, and Zivid cameras to recognize objects/enclosures in totes and calculate 3D poses relative to robotic arm base.
- Implemented heuristic behavior tree force closed-loop feedback controller for robotic arm placement operations and developed dynamic end effector model with force sensor compensation calibration.
- Built testing rig assembly with lead screw drives, power electronics, stepper motors, and ESP32 microcontroller; coded firmware for position control and serial communication.

Robotic Mechanical Design Engineer| *January 2023- August 2023***|** ***MIT Lincoln Lab****, Lexington, MA*

- Designed, fabricated, and tested patented R&D hardware for AI-GUIDE (Artificial Intelligence-Guided Ultrasound Interventional Device) which is a semi-autonomous medical device in development for the Department of Defense.
- Designed parts for vacuum forming and injection molding. Fabricated a 3D printed vacuum forming setup.
- Designed testing rigs and testing procedures to quantify the performance of hardware parts.

R&D Engineering Intern | *August 2022 - October 2022| Cleana, Inc. , Boston, MA*

- Designed and manufactured an Arduino-based testing rig for mechanically-driven automatic self-lifting toilet seats.
- Assisted in R&D product design using SolidWorks, 3D printing, and CNC machining.

Manufacturing Engineering Lab Assistant | *January 2021 - December 2022| EPIC Lab, Boston University, Boston, MA*

- Operated various manufacturing equipment including CNC machines, laser cutters, and 3D printers to produce client-requested parts; Designed and fabricated custom fixtures to support manufacturing processes.
- Provided technical consultation to students on optimal design choices for DFM and DFA.

Engineering Researcher | June 2022 - December 2022| Andersson Lab, Boston University, MA

- Designed and programmed autonomous quadcopters using Raspberry Pi, Motion Capturing Cameras, and Python.
- Fabricated and repaired quadcopters that utilized brushless motors, ESCs, flight controllers, and radio communication.
- Developed PID controllers for precise quadcopter position and orientation control. Utilized ROS for simulation and testing of quadcopter behavior.

PROJECTS

Multi-Robotic Arm Controller for Orientation Control of Large Objects*| Master's Independent Study Project | January 2025-May 2025*

- Developed offline motion planning Python program for coordinated trajectory and grasping commands across four robotic arms with suction-cup end effectors to control large object orientation. Implemented simulation using UR5e URDF files and PyBullet for program validation and testing.

Autonomous Strawberry Harvesting Robot | *Senior Capstone Project | September 2022- May 2023*

- Lead a team of five to design an autonomous robot with visual recognition system to detect and harvest strawberries; manufactured hardware and integrated components such as servo motors, depth cameras, arduino, stepper motor linear drives, and a Nvidia Jetson Nano.
- Programmed path planning and inverse kinematic algorithms for precise strawberry harvesting and stem clipping operations.

SKILLS

Software & Programming: SolidWorks, C/C++, Python, MATLAB, ROS, Gazebo, PyTorch, Neural Networks, Simulink, FEA.
Robotics & Control: Motion Planning(Potential Fields, A*, trajectory generation), PID Controllers, Dynamic Modeling, Inverse Kinematics, Sensor Fusion, Filters, Optimization Programs, Eye-to-Hand Calibration, Computer Vision, Arduino, Raspberry Pi, Embedded/Firmware Software, Communication Protocols(I2C, UART, CAN, UDP, TCP), ROS, Linux. **Manufacturing & Prototyping:** CNC Mills/Lathes, 3D Printing (FDM, SLA), Electronic and PCB Circuit Design, Multimeter, Oscilloscope, GD&T.