Nicolas G. Morales

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EDUCATION

Northwestern University, Evanston, IL — December 2023
Master of Science in Robotics

Purdue University, West Lafayette, IN — May 2019
Bachelor of Science in Mechanical Engineering, Purdue Honors College — Cumulative GPA: 4.00 / 4.00
Minors: Electrical and Computer Engineering, Spanish

University of Canterbury, Christchurch, New Zealand — February 2018 – June 2018
Certificate of Proficiency with a focus on electrical and mechanical engineering

WORK EXPERIENCE

DMC, Inc: Systems Engineer II (*Chicago, IL*) — August 2019 – August 2022

Selected Specific Projects

- Onsite technical project lead for new battery production line projects at leading electric car company
- Co-project manager for automated safe loading system project at high-speed transportation research and development company
- Primary developer of data collection and storage application for cartridge production data at healthcare diagnostics company

General Responsibilities

- Developed customized automation and SCADA solutions for machine/process control and data collection in multiple industries
- Interfaced with clients to coordinate efforts, better meet customer needs, and communicate project status regularly
- Troubleshot automation systems developed by DMC, clients, and 3rd parties to prevent disruption of production facilities
- Estimated project costs, wrote proposals, and successfully sold projects up to $300K to new and existing clients

Northrop Grumman (Orbital ATK): Mechanical Engineering Intern *(Dayton, OH)* — Summer 2016; Winter 2017; Summer 2018

- Employed several CAD packages to design and additively manufacture novel structures for research and development efforts
- Modified open source FFF machine hardware and electronics to improve performance and work with new materials

Herrick Laboratories: Undergraduate Research Assistant (*West Lafayette, IN*) — June 2017 – May 2019

- Published a paper on the effects of interlayer wait time on the mechanical strength of additively manufactured parts
- Designed, laid out, and manufactured PCBs to assist with research efforts across the research group

ENGINEERING PROJECTS

Unitree Go1 Robot Dog Autonomous Inspection: — January 2023 – March 2023

- Upgraded onboard Jetson Nanos to ROS 2 Humble and wrote base C++ nodes for Go1 motion control and camera interfacing
- Integrated Go1 control package and LiDAR with Nav2 stack for SLAM, autonomous navigation, and obstacle avoidance
- Utilized EAST text detection and CRNN text recognition machine learning models to interpret text data in the Go1's environment

Attack of the Franka 7-DoF Robotic Arm Control: — November 2022 – December 2022

- Created a ROS 2 system to control a Franka Emika Panda arm to knock over "enemy" targets while protecting "allies"
- Architected an API to allow non-blocking usage of the ROS 2 MoveIt Motion Planning Framework in Python
- Designed a computer vision node that employed a RealSense D435i, OpenCV, and AprilTags to detect the workspace and targets

Differential Drive EKF SLAM Package: — January 2023 – March 2023

- Implemented Extended Kalman Filter SLAM from scratch in ROS 2 with C++ for localization of a TurtleBot3 with LiDAR data
- Employed odometry, supervised and unsupervised learning, and a custom simulation to create and evaluate the SLAM algorithm

Gesture Controlled Robotic Arm (IMUnipulator): — November 2022 – December 2022

- Programmed an nRF52-based microcontroller in C to move a 2-DoF robotic arm based on input signals from a 9-DoF IMU
- Wrote drivers for I2C communication, PWM, servos, capacitive touch sensors, and more to interact with required devices

SimpleStrings Assistive Guitar Device: — January 2019 – May 2019

- Worked with a team of engineers to develop an Arduino-based programmable assistive chord playing device for music therapy
- Designed, laid out, and assembled custom PCB/device electronics to receive inputs and control 24 actuation motors

Purdue Lunabotics: — September 2015 – May 2017

- Directed a subteam tasked with designing, prototyping, and testing excavation/deposition systems intended to mine lunar soil

SKILLS

Software: C++, C, Python, Robot Operating System (ROS 2/ROS), Linux, Git, SVN, SQL, Structured Text, VBScript, MATLAB
Automation: Beckhoff TwinCAT, Ignition, Siemens TIA Portal, Rockwell Studio 5000, WinCC 7
Design: Inventor, NX, SolidWorks, CATIA, Creo, KiCad, Simplify3D, Cura
Language: Spanish (9.5 years education)

HONORS AND AWARDS

Purdue 2015 Stamps Leadership Scholar — March 2015 – May 2019
Pi Tau Sigma Mechanical Engineering Honors Society, Beta Chapter — September 2016 – May 2019