Nikolas Xarles Gamarra

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EDUCATION - NXG.Engineer/Expierence

Bachelors of Science in Robotic Engineering **Aug 2015 - May 2019**

Worcester Polytechnic Institute (WPI), Worcester, MA

Minor In Computer Science
Minor in Mechanical Engineering
Graduated With Distinction

RESEARCH INTERESTS

Real Time Motion Control, Kinematics, 3D Perception, Localization, Sensor Fusion, Sustainable Transportation, Safety Systems, Machine Learning for robot perception and kinematic control

TECHNICAL SKILLS - NXG.Engineer/Resume

Software Tools (Programming): Visual Studio/VS Code, Vim, Git/Bitbucket, Jira, Robot Operating System (ROS)
Programming Languages*:* C/C++, Python, Bash, C#, JavaScript, Matlab, IEC 61131-3 Structured Text (ST)
Software Tools (Design)*:* SolidWorks**,** Autodesk Inventor, AutoCAD
Fabrication: 3D printing, laser cutting, soldering, manual/CNC mills/lathes, ESPRIT CAM
Hobbies: Woodworking/Carpentry, Film Photography, Home Improvement

HONORS AND AWARDS - NXG.Engineer/Expierence

Graduation With Distinction - Worcester Polytechnic Institute

A grade of *A* on the following criteria: MQP, IQP, Inquiry Seminar/Practicum, Four units (12/3 units) of work registered at WPI (exclusive of PE and of the MQP, IQP and the Inquiry Seminar/Practicum component of the Humanities and Arts Requirement).

National Hispanic Recognition Program Aid Scholarship - West Lafayette Jr/Sr Highschool

Core 40 with Academic Honors - West Lafayette Jr/Sr Highschool

PROJECTS - NXG.Engineer/Portfolio

Robotic Drawing of Pointillism Style Images (Industrial Robotics Course Project) ***Oct 2018 – Dec 2018***

Designed and manufactured end of arm tooling for industrial robotic arm to hold three colored markers, image dithering algorithm to generate drawable images, industrial arm control program in ROS for planning movements to draw images

Automatic Vehicle Recharging Station (Undergraduate Degree Capstone Project) **Aug 2018 – May 2019**

Design of complex end effector, control & sensor fusion software to automatically plug in an autonomous electric vehicle for charging. Use of: ABB IRB 1600 industrial robotic arm, ROS-Industrial, ROS SMACH (*State Machine*), OpenCV, PCL (*Point Cloud Library*), C/C++, Python, Microsoft Kinect, kinematic and pose transformations using linear algebra.

Autonomous Room Mapping (Robotics Navigation Course Project) ***Oct 2017 – Dec 2017***

Implementation of A* pathfinding algorithm in ROS/Python based on occupancy map on a TurtleBot running ROS/Ubuntu.

Robot Kinematics (Robotics Manipulation Course Project) ***Aug 2017 – Oct 2017***

Control of three degree of freedom Robot arm using forward and inverse kinematics for position and velocity control. Programming in C++ for firmware and Matlab for high level kinematics control loops. Using computer vision and torque sensing to determine control state machine logic.

RBE 2002 Sensing (Robotics Sensing Course Project) **Oct 2016 – Dec 2016**

CADed, manufactured, coded, and documented a robot capable of autonomously navigating a walled obstacle course, finding a flame, recording its location relative to origin, extinguishing it, and returning to its origin.

Kerbal Space Program Custom Controller Board (Individual) **Aug 2015 – Feb 2016**

Laser etched acrylic control panel for space simulation video game. Used Arduino and C programming concepts to communicate user inputs with the game. Built out of many reused components from vintage electronics. Demonstrated project at World Maker Faire.

Motorized Bike (Individual) **Jan 2015 – Dec 2015**

Custom machined parts, custom modular lighting circuitry with fully functional brake and turning lights, use of 3D printed parts. Expanded understanding of carburetors and two stroke engines.

Ant weight BattleBot (Extracurricular Team) **Jan 2016**

WPI Robotics Club (WRC) Extracurricular Activity: Design, CAD, and Fabrication of 3 lbs combat robot. Competed in MASSdestruction events hosted by Artisan's Asylum.

Networked Digital Clock (Highschool IT Course) **Jan 2015 – May 2015**

Final Project for Information Technology class, West Lafayette, IN: Software, hardware, and documentation for digital wall clock following the system development life cycle. Programmed in C on a Raspberry PI. Use of shift registers and 7 segment display.

PROFESSIONAL EXPERIENCE - NXG.Engineer/Expierence

Controls Engineer - Chicago Dryer **Sep 2025 - Present**

Programming back end controls and front end HMI for industrial scale laundry machines used for automated ironing and folding of laundry with Beckhoff TwinCAT Structured Text back end and HTML HMI.Problem solving skill on intricate industrial machines. Designing for safety and manufacturability. Integration of hardware specific communication protocol. Refactoring software for modularity, reusability, maintainability.

Software Development Engineer - Progress Rail, A Caterpillar Company **Nov 2023 - Oct 2025**

Architecting, programming, and testing of embedded software deployed on QNX Real-Time Operating System. Knowledge of intricate relationships between electrical, mechanical, and software systems on locomotives. Reading electrical diagrams. Rigorous testing and peer review of software. Automating software builds with bash

scripts in a Unix shell. Detailed and traceable documentation of software changes in compliance with EN 50716 and MISRA for safety certifications. Use of Jira and command line Git. Visited Pueblo Rail Testing Facility as well as Metra rail yards. Worked remotely in Chicago and in person in LaGrange.

Robotics Engineer - Robotic Systems Integration (RSI) **June 2019 – Oct 2023**

Design and implementation of an API and G-Code Parser for 3D trajectory planning on arbitrary kinematics utilizing Orocos Kinematics and Dynamics Library. Utilization of EtherCAT for real time motion control. Backend motion controller software development. Design and implementation of automated software and hardware tests. Design (Solidworks) of industrial automation workcells and drive/motor demonstration units. Selection of sensors, motors, and servo drives for industrial automation projects. Front end user interface design in C# WPF. Design and manufacturing of 3D Printed holder for Servo Drives and motors to send to customers for demoing motion control software.

Software Engineering Intern - SAIC Motor (Vehicle Software & Intelligence Center) **May 2018 – July 2018**

Over the summer of 2018 I interned abroad in Shanghai at SAIC's Vehicle Software & Intelligence Center. During my internship I developed a collection of ROS (Robot Operating System) nodes that utilized PCL (Point Cloud Library) to interpret point cloud data. The program was capable of reporting location and type of various objects above the road surface. Below a before and after image can be seen of how my program visualized the objects it detected on the road using RVIZ. Each vehicle has a box around it originating at its estimated center. The color of the box depends on an estimate of the type/size based on number of points and proximity. The green rings represent the points the program thinks are on the road plane. To detect the objects the program utilizes clustering based on difference of normals for points above the road plane. Using well designed launch files and ROS parameters the program can quickly be set to work with data from various 3D lidars, .PCD files, and ROS bag streams. During my internship I learned a lot about lidars, PCL, ROS, C++, and Chinese culture.

Engineering Computer Network(ECN) - Purdue University **May 2016 – Aug 2016**

IT support for Purdue Engineering departments. Gained experience collaborating in a work environment to solve problems for users. Gained additional experience using Windows and Linux command line interfaces and using a trouble ticket system.

PUBLICATIONS - Scholar.Google.com/Citations

Collins Matthew, Jacob Remz, **Nikolas Gamarra "**RBE 2001 Curriculum Review"
Bachelors of Science Interdisciplinary Project Paper

Jacob Remz, Matthew Fortmeyer, **Nikolas Gamarra**, Robert O'Brien **"**Automatic Vehicle Recharging Station (AVRS)"
Bachelors of Science Capstone Project Project Paper

LANGUAGES

English (*native/C2*)
Spanish (*intermediate/B1*)

RELEVANT COURSES

Course	Number (Catalog Link)	School	Level
Data Structures and Algorithms	CS 331	IIT	Masters (Degree not acquired)
Introduction to Artificial Intelligence	CS 480	IIT	Masters (Degree not acquired)
Science of Programming	CS 536	IIT	Masters (Degree not acquired)
Introduction to Artificial Intelligence	CS 4341	WPI	Bachelors (Senior Level Course)
Industrial Robotics	RBE 4815	WPI	Bachelors (Senior Level Course)
Unified Robotics IV (Navigation)	RBE 3002	WPI	Bachelors (Junior Level Course)
Unified Robotics III (Manipulation)	RBE 3001	WPI	Bachelors (Junior Level Course)
Unified Robotics II (Sensing and Perception in Robotics)	RBE 2002	WPI	Bachelors (Sophomore Level Course)
Unified Robotics I (Mechanical Applications in Robotics)	RBE 2001	WPI	Bachelors (Sophomore Level Course)
Software Engineering	CS 3733	WPI	Bachelors (Junior Level Course)
Modeling And Analysis Of Mechatronic Systems	RBE 4322	WPI	Bachelors (Senior Level Course)
Fluid Mechanics	ES 3004	WPI	Bachelors (Junior Level Course)
Computer Networks	CS 3516	WPI	Bachelors (Junior Level Course)
Control Engineering I	ES 3011	WPI	Bachelors (Junior Level Course)
Human-Computer Interaction	CS 3041	WPI	Bachelors (Senior Level Course)
Object-Oriented Design Concepts	CS 2102	WPI	Bachelors (Sophomore Level Course)
Algorithms	CS 2223	WPI	Bachelors (Sophomore Level Course)
Systems Programming Concepts	CS 2303	WPI	Bachelors (Sophomore Level Course)
Embedded Computing In Engineering Design	ECE 2049	WPI	Bachelors (Sophomore Level Course)

Systems Programming Concepts	CS 2303	WPI	Bachelors (Sophomore Level Course)
Stress Analysis	ES 2502	WPI	Bachelors (Sophomore Level Course)
Introduction To Dynamic Systems	ES 2503	WPI	Bachelors (Sophomore Level Course)
Introduction To Digital Circuit Design	ECE 2029	WPI	Bachelors (Sophomore Level Course)
Ordinary Differential Equations	MA 2501	WPI	Bachelors (Sophomore Level Course)
Matrices And Linear Algebra I	MA 2071	WPI	Bachelors (Sophomore Level Course)
Probability For Applications	MA 2621	WPI	Bachelors (Sophomore Level Course)
Calculus I, II, III, and IV	MA 1024	WPI	Bachelors (Freshman Level Course)