

Giovanni Cordova

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Research Interests

My passion lies in AI-enabled robotics, specifically dexterous manipulation, end-effector design, and hardware–software integration. I'm focused on leveraging deep reinforcement learning, motion planning, and real-time control for dynamic grasping solutions. I aim to enhance real-world applicability through photo-realistic simulation and transfer learning.

Education

B.S. Mechanical Engineering (Honors) | University of New Mexico (UNM) **Fall 2021 - Spring 2024**
Honors Thesis: *Autonomous Robotic Manipulation of Orbital Replacement Units for Satellite Servicing* **GPA 3.64**
Advisor: *Dr. Rafael Fierro*

Academic Experience

Undergraduate Robotics Researcher **August 2022 - Present**
UNM - AFRL Agile Manufacturing Laboratory — *Dr. Rafael Fierro*
UNM Department of Electrical Engineering

- *Manufactured a 1'x1'x1' smart satellite test bed and 16'x6'x8' linear rail system to experimentally model robotic satellite servicing tasks.*
- *Programmed a UR5e robotic manipulator remotely using Python and ROS, mounted it on a 30-foot 7th-axis linear rail, and 3D printed a wrist-mounted electrical housing for a UR5e tactile sensor.*
- *Designed and built a 3D printed testbed to identify the system characteristics of a torque-limiting coupling, and presented research results to technical and non-technical audiences.*
- *Captured position data with a VICON motion tracking system and force data with a Vernier dual-range force sensor, then processed and analyzed the data using MATLAB and Simulink.*
- *Developed a 2 DOF inverse kinematic simulation in Python on PyCharm, and programmed stepper motors to operate sinusoidally via an Arduino UNO.*

Undergraduate Researcher **May 2022 - September 2022**
WHY Laboratory — *Dr. Eric Hamke*
UNM Department of Electrical Engineering

- *Conducted sliding mesh CFD analysis using SOLIDWORKS Flow Simulation software and Design of Experiments testing methods to optimize a low windspeed turbine design for maximum torque generation.*
- *Reviewed 30+ academic papers and created a 26-page research report and design proposal.*
- *Utilized additive manufacturing and rapid prototyping to create a functional prototype and 30th-scale model for further wind tunnel analysis.*

Undergraduate Research Assistant **September 2021 - February 2022**
Thermodynamic Fluids Under Extreme Conditions Lab — *Dr. Daniel Banuti*
UNM Department of Mechanical Engineering

- *Created enthalpy vs temperature graphs at various pressures for Argon using Python code on Jupyter Notebook.*

Refereed Publications

[C1] 2023 IROS *Autonomous Multi-Robot Servicing for Spacecraft Operation Extension*
L. Gao, G. Cordova, C. Danielson, and R. Fierro

Presentations

- Poster Presentation** — *Autonomous Robotic Manipulation of Orbital Replacement Units for Satellite Servicing* **October 13th, 2023**
NMSU AMP Student Research Conference
- Conference Presentation** — *Autonomous Robotic Manipulation of Orbital Replacement Units for Satellite Servicing* **September 15th, 2023**
UMBC McNair Research Symposium w/ NSF & US Dept. of Education
• *One out of ten McNair Scholars in the US chosen to present for the NSF & US Department of Education.*
- Conference Presentation** — *Autonomous Robotic Manipulation of Orbital Replacement Units for Satellite Servicing* **September 7th, 2023**
UNM McNair Scholars Research Conference
- Conference Presentation** — *Autonomous Robotic Manipulation of Orbital Replacement Units for Satellite Servicing* **July 27th, 2023**
UNM McNair Summer Research Symposium
- Event Host** — *Order of the Engineer Induction Ceremony* **May 1st, 2023**
UNM - New Mexico Society of Professional Engineers
- Conference Presentation** — *Modeling Robotic Satellite Repair* **April 21st, 2023**
UNM Undergraduate Research Opportunity Conference
- Introductory Host** — *Jack Dongarra, ACM 2021 Turing Awardee* **October 10th, 2022**
UNM Student Q&A Lunch Session
- Poster Presentation** — *Robotic Geosynchronous Equatorial Orbit (GEO) Satellite Repair, Servicing, and Assembly* **October 7th, 2022**
NMSU AMP Student Research Conference
- Conference Presentation & Video** — *What is Terracing?* **April 7th, 2022**
UNM Undergraduate Research Opportunity Conference
Video Link: <https://uradexpo.unm.edu/what-is-terracing/>

Industry Experience

- Lead Engineering Intern Project Manager** **May 2021 - September 2021**
Focused Sun — Las Cruces, New Mexico
- *Led a team of five engineering interns to develop a prototype 20' shipping container with solar concentrators, thermal storage, and power generation.*
 - *Coordinated with the founder and presented progress to six members of the executive staff weekly for 12 weeks.*
 - *Managed product development, research and development, testing, and material sourcing for the entirety of the summer research project.*
 - *Manufactured stack press, mirror assembly, frame, thermal storage tank, and absorber arms.*
 - *Operated heavy-duty tools, including MIG welders, plasma torches, sheet metal shears, rollers, and brakes.*
- UX/UI Design Certification** **February 2021 - May 2021**
Central New Mexico Community College — Albuquerque, New Mexico
- *Co-designed an iPhone app with 76+ pages and 35+ unique icons for local food truck businesses.*
 - *Developed a three-page, in-depth and comprehensive demographics research document.*
 - *Collaborated to evaluate adjoining businesses in a four-page comparative analysis.*
 - *Developed a modern website and extensive design guidelines for a virtual reality business.*
 - *Analyzed local and national virtual reality businesses in a 13-page competitive analysis.*
 - *Documented mission/vision statements of various successful companies in a five-page research document.*

Awards and Honors

2023	Outstanding Junior Award <i>UNM Department of Mechanical Engineering</i>
2023 - Present	NSF S-STEM Scholar <i>National Science Foundation S-STEM Program</i>
2022 - Present	McNair Scholar <i>Ronald E. McNair Scholars Program</i>
2022	Grand Challenges Scholar <i>UNM Grand Challenges Scholars Program</i>
2021 - Present	Undergraduate Research Scholar <i>New Mexico Affiliation for Minority Participation</i>

Leadership Experience

2023 - Present	Student Council President <i>UNM School of Engineering</i>
2023 - Present	Joint Council Representative <i>UNM Associated Students</i>
2022 - Present	Secretary <i>UNM AIAA</i>
2021 - Present	President & Founder <i>UNM ASME</i>

Competitions

ASME 2024 Innovative Additive Manufacturing 3D Challenge (IAM3D) 2024
UNM ASME Project Manager

- *Currently leading 25 undergraduate students as the lead project manager for the UNM ASME Chapter's competition vehicle for the IAM3D Competition.*
- *Leading the team in the design of a human controlled unmanned aerial vehicle with the capacity to pickup and drop-off 1"x1"x1" PLA printed cubes, which will race against other competition vehicles.*
- *Responsible for designing and implementing the first-person viewing cameras for the drone.*

ASME 2023 e-Human Powered Vehicle Competition (e-HPVC) 2023
UNM ASME Project Manager

- *Led a diverse team of 20 undergraduate and graduate students as the lead project manager of the UNM ASME 2023 Competition Vehicle.*
- *Designed and fabricated a fully operational electrically powered recumbent bicycle with carbon fiber aerodynamic fairing within a single semester.*
- *Presented our competition vehicle entry by delivering a 15-page design presentation and a 13-page technical design report to a panel of national judges.*