

PIERO JESUS FLORES LOPEZ

Mechatronics & Robotics Engineer

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PROFESSIONAL PROFILE

Mechatronics Engineer with hands-on experience in robotics, industrial automation, and mechanical design. Currently completing an MSc in Robotics at the University of Birmingham, where my thesis is the design, build and metrological validation of a laser triangulation metrology machine for cylindrical parts, targeting 25-micrometer expanded uncertainty (GUM/NIST, Gage R&R). Proven ability to integrate robotic systems (xArm 6, custom manipulators), program PLCs (Siemens), implement computer vision pipelines, and develop AI-based control (reinforcement learning, inverse kinematics solvers). International academic background spanning Germany, Spain, Italy, Mexico, and the UK. Seeking graduate engineering roles in robotics, automation, metrology, or AI.

EDUCATION

MSc in Robotics · Sep 2025 - Sep 2026

University of Birmingham, United Kingdom

- Thesis: Design, build and metrological validation of a laser line triangulation scanning machine for cylindrical part inspection (OD/ID)
- Modules: Autonomous navigation, SLAM, reinforcement learning, 3D mapping, LiDAR processing, applied robotics
- Key projects: Autonomous navigation for Clearpath Moose robot (OctoMap, A*); autonomous fruit sorting with Quanser QArm + Intel RealSense D415 (inverse kinematics, HSV vision, hand-eye calibration)

BSc in Mechatronics Engineering · Aug 2019 - Jun 2024

Tecnologico de Monterrey, Mexico | 2:1 Upper Second-Class Honours equivalent

- International exchanges: Hochschule Offenburg (Germany), Universitat de Barcelona (Spain), Universita di Genova (Italy)
- SolidWorks certified: CSWA and CSWP
- Key project: Automated FrED assembly station with xArm 6, PLC, HMI, and machine vision (in partnership with MIT)

TECHNICAL SKILLS

- **Programming:** Python, C/C++, SQL, HTML/CSS/JavaScript, PHP
- **Robotics & Automation:** ROS2 (Jazzy), MoveIt2, Gazebo, MuJoCo, xArm SDK, Quanser SDK (QArm, HIL), Intel RealSense SDK, PLC programming (Siemens TIA Portal), Ladder Logic
- **CAD & Simulation:** SolidWorks (CSWA & CSWP), MATLAB & Simulink, Siemens Plant Simulation
- **AI & Machine Learning:** PyTorch, Stable-Baselines3 (PPO), Gymnasium, TensorFlow, computer vision (OpenCV, Datalogic, Intel RealSense D415 RGB-D)
- **Robotics Algorithms:** Forward/inverse kinematics, DH parameters, analytical IK + Newton-Raphson refinement, hand-eye calibration (Umeyama SVD), cubic-spline trajectory planning, EKF sensor fusion, ICP, OctoMap, A* path planning, SLAM

- **Metrology & Quality:** Laser line triangulation sensors, optical metrology, GUM/NIST uncertainty analysis (expanded uncertainty, $k=2$), Gage R&R measurement system analysis, automated pass/fail QC reporting
- **Embedded Systems:** Teensy 4.1, Arduino, Raspberry Pi, STM32, stepper motor control (STEP/DIR), GPIO, MOSFET circuits
- **Communication Protocols:** TCP/IP sockets, Ethernet industrial, digital I/O (PNP/NPN), URDF/Xacro
- **Databases:** MySQL, MongoDB
- **Operating Systems:** Linux (Ubuntu 24.04), Windows

KEY PROJECTS

[Laser Triangulation Metrology Machine for Cylindrical Parts \(OD/ID\)](#) · 2026

MSc Thesis | University of Birmingham | Individual project | [GitHub repo](#)

- Designing and building a non-contact optical inspection machine that measures OD, ID, roundness and wall thickness of machined steel cylinders (bores from 127 mm, OD to 203 mm, length 610 mm) with automated pass/fail QC reporting
- Architected the full electro-mechanical measurement system (sensor configuration, motion axes and datum strategy) for complete internal and external surface coverage (design details withheld pending IP review)
- Developing a GUM/NIST uncertainty budget targeting expanded uncertainty $U(k=2) \leq 25 \mu\text{m}$ against a $254 \mu\text{m}$ tolerance ($U/T \leq 10\%$), validated with Gage R&R measurement system analysis
- Research contribution: measurement methodology for gauge-capable accuracy ($U/T \leq 10\%$) on workshop-grade hardware, benchmarked against commercial inspection systems
- Produced a 160-item engineering BOM and a 43-part CAD assembly with collision resolution; engaged vendors (RIFTEK, Renishaw, Tecnotion) on sensor linearity, encoders and torque motors
- Aligned architecture to a ~US\$25,000 BOM for affordable deployment in machine shops
- **Tech stack:** Python, SolidWorks, laser triangulation profilers, precision angle encoders, GUM/NIST, Gage R&R

[Autonomous Navigation for All-Terrain Robot](#) · 2025 - 2026

University of Birmingham | Team of 4 | [GitHub repo](#)

- Built the 3D mapping and perception module for a Clearpath Moose 8-wheel grass-cutting robot navigating hilly terrain with slope hazard avoidance (>20 degrees)
- Implemented OctoMap (octree with log-odds probabilistic occupancy, depth 12) with dynamic map recentring for unbounded exploration, plus a 200×200 elevation grid with slope/roughness-based traversability cost maps
- Developed LiDAR processing pipeline: point cloud range filtering (0.3-50 m), voxel grid downsampling (0.1m), ICP scan matching for drift correction
- Integrated with team modules: EKF sensor fusion (odometry + compass + GPS + IMU), A* path planning, and real-time hazard detection
- **Tech stack:** C (2,600 lines), Webots, custom implementations of EKF, OctoMap, ICP, A*

[Autonomous Fruit Sorting with Quanser QArm and RealSense D415](#) · 2025 - 2026

Applied Robotics | University of Birmingham | Team of 4 | [GitHub repo](#)

- Built an end-to-end pick-and-place system on a Quanser QArm 4-DOF arm with an Intel RealSense D415 RGB-D camera, sorting 14 fruits (strawberries, bananas, tomatoes) into 3 target baskets under both autonomous and teleoperated modes
- Implemented analytical inverse kinematics with Newton-Raphson refinement achieving sub-micrometer round-trip error (0.0002 mm) and joint-limit-aware solution selection across four candidate branches
- Developed HSV color plus circularity-based shape classifier on OpenCV, with pixel-to-world back-projection from the D415 depth stream (1280x720 at 30 fps) for accurate 3D target localisation
- Wrote a 13-state finite-state-machine controller orchestrating scan, approach, grasp, transport and place phases, with cubic rest-to-rest spline trajectories, gripper clamping and Z-height safeguards against table collisions
- Performed hand-eye calibration with the closed-form Umeyama SVD method and designed a Simulink facade wrapping the Python algorithms via py.* calls, providing an auditable control layer on top of the Quanser HIL stack
- Built supporting tooling: interactive teach pendant with live D415 view, keyboard jog and waypoint save/load; hand-eye calibration utility; and timestamped trace logging for post-mortem debugging
- **Tech stack:** Python 3.13, NumPy, OpenCV, Quanser SDK (HIL), Intel RealSense SDK, MATLAB/Simulink R2025a

[Automated Manufacturing Station with xArm 6](#) · 2023

Tecnologico de Monterrey in partnership with MIT | Team of 4 | [GitHub repo](#)

- Programmed a complete pick-and-place sequence in Python (xArm SDK) for FrED device assembly: multi-phase trajectory with 3 aluminum profiles, MDF plate, and 6 PLA holders, with every move timestamped for cycle-time analysis on the real hardware
- Programmed Siemens PLC (7 Ladder Logic networks) for station coordination: conveyor control, photoelectric sensor integration, robot-PLC bidirectional signaling, and HMI status display
- Configured Datalogic machine vision camera for quality inspection (Pinpoint Pattern Find, Blob analysis, Pass/Fail criteria) with discrete output to PLC
- Implemented TCP/IP socket communication between Datalogic camera (192.168.1.130:20000) and robot for real-time coordinate transfer and camera-to-gripper offset compensation
- Programmed 4-cycle palletizing routine with dynamic position compensation in Python
- Built digital twin in Siemens Plant Simulation for production flow validation and cycle time optimization
- Designed custom pneumatic gripper and 3D-printed fixtures for multi-part handling
- **Tech stack:** Python, xArm SDK, Siemens TIA Portal, Datalogic vision, Siemens Plant Simulation

PROFESSIONAL EXPERIENCE

Full-Stack Software Engineer · Bora Hotel Iquitos

Iquitos, Peru · November 2025 - Present

- Sole engineer hired to build and operate the PMS/CRM that runs the hotel's daily operation (reservations, multi-currency billing, finance, payroll and guest messaging).
- Custom PMS/CRM in production: ~160k lines of code (PHP 8.3 with in-house MVC architecture + JavaScript), 75 domain models, internal REST API, 60+ versioned database migrations applied with zero data loss.

- Integrations: WhatsApp Cloud API (automated guest notifications + two-way inbox), OpenPay payment gateway with automatic reconciliation, BCRP daily exchange rate, receipt OCR pipeline, MINCETUR regulatory reports.
- 28 scheduled automations (cron): daily financial reports by email, shift closing, monthly Excel exports, staff attendance reconciliation.
- Security: TOTP 2FA, Cloudflare Zero Trust, login rate limiting, secrets encryption, full audit logging, role-based access control.
- Infrastructure: Linux VPS (Hetzner), Caddy/PHP-FPM/MySQL, staging environment, automated deploys with CDN purge, encrypted offsite backups.

Stack: PHP · MySQL · JavaScript · REST · Meta WhatsApp API · Cloudflare · Linux · Git

Reference: Margarita Lopez · margarita@borahoteliquitos.com

Automation Engineer · 2024 - 2025

Argos Automation Engineering, Mexico

- Designed and implemented automated, computer-controlled processes on proprietary microcontroller and microprocessor platforms
- Developed and maintained embedded C projects, integrating industrial communication protocols such as CAN bus to analyse existing systems and deliver efficient automation solutions

Reference: Eduardo Denis · edenis@argoses.com

Mechanical Design Intern · 2022

Alfa Soldadura, Mexico

- Created mechanical designs, assemblies, and engineering drawings in SolidWorks for welding equipment manufacturing
- Produced and validated technical documentation for manufacturing processes and quality control

Engineering Intern · 2020 - 2021

Argos Automation Engineering, Mexico

- Supported the Design & Development department with CAD modifications, technical drawings, and Bills of Materials (BOMs)
- Coordinated with suppliers in Mexico and the USA for component sourcing and procurement
- Assisted in quality testing, project supervision, and stakeholder reporting

Reference: Eduardo Denis · edenis@argoses.com

LANGUAGES

Spanish: Native | **English:** Advanced (Professional Working Proficiency)

ADDITIONAL INFORMATION

- Right to work in the UK (eligible for Graduate Visa)
- Nationality: Peruvian
- International experience: Peru, Mexico, Germany, Spain, Italy, United Kingdom



To whom it may concern,

I am writing to sincerely recommend Piero Jesus Flores Lopez for any opportunities that may arise in the field of mechatronics and engineering. I had the privilege of supervising Piero during his university degree practices, and I am pleased to provide this letter of recommendation based on my observations and interactions with him.

Piero joined our team as a mechatronic engineering student and quickly demonstrated an exceptional level of dedication, aptitude, and passion for his chosen field. Throughout his time with us, he consistently exhibited a strong work ethic, analytical skills, and a keen ability to grasp complex engineering concepts.

One of Piero's notable strengths is his proficiency in integrating mechanical and electronic systems, showcasing his comprehensive understanding of mechatronics. His hands-on experience in designing and implementing mechatronic solutions was particularly impressive. He actively participated in various projects, demonstrating both innovation and a meticulous attention to detail. I was particularly impressed with his capabilities for CAD design and programming skills, where Piero played an important role in developing prototypes and assembly processes for downhole tools for the Oil and Gas market.

Moreover, Piero is an excellent team player and communicator. He effectively collaborated with team members, contributing ideas and insights that enriched the overall project outcomes. His ability to communicate complex technical concepts in a clear and concise manner is a testament to his strong interpersonal and presentation skills.

In addition to his technical capabilities, Piero possesses a high level of professionalism and a strong sense of responsibility. He consistently met project deadlines, and his commitment to producing high-quality work was evident in all aspects of his contributions to our team.

I am confident that Piero will excel in any mechatronics-related role and will be a valuable asset to your organization. His combination of technical proficiency, dedication, and interpersonal skills makes him an outstanding candidate for any mechatronics position.

If you have any further questions or require additional information, please feel free to contact me at edenis@argoses.com or +52 999-298-87-57. I am more than happy to provide further insights into Piero's capabilities and achievements.

Thank you for considering Piero for the opportunity, and I am certain that he will make significant contributions to your organization.

Sincerely,

Eduardo Denis
New Technology & Engineering Manager
Argos Energy
01/16/2024

OFICINAS

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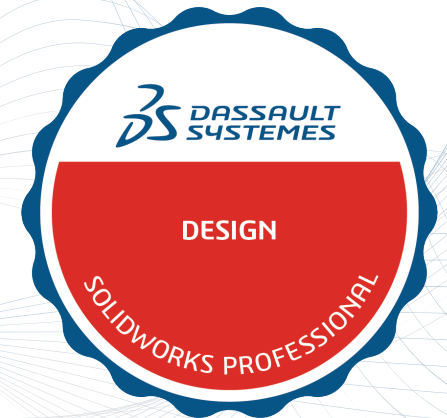
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CONTACTO

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CERTIFICATE

Dassault Systèmes confers upon
PIERO JESUS FLORES LOPEZ
the certificate for
SOLIDWORKS Design Professional
(CSWP)



September 28 2022

Academic exam at Instituto Tecnológico y de Estudios Superiores de Monterrey

A handwritten signature in black ink, appearing to read 'Manish Kumar'.

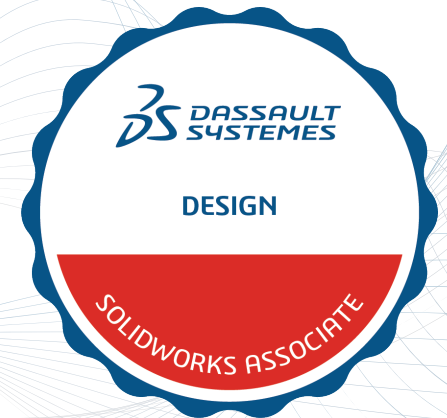
Manish KUMAR
SOLIDWORKS CEO
R&D Vice President



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CERTIFICATE

Dassault Systèmes confers upon
PIERO JESUS FLORES LOPEZ
the certificate for
SOLIDWORKS Design Associate
(CSWA)



July 18 2022

Academic exam at Instituto Tecnológico y de Estudios Superiores de Monterrey

A handwritten signature in black ink, appearing to read 'Manish Kumar'.

Manish KUMAR
SOLIDWORKS CEO
R&D Vice President



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