Raphael Silveira e Silva

Belo Horizonte, Brazil | Available for Relocation to the U.S. | Visa Sponsorship Required  
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# Professional Summary

# Hands-on Mechanical Engineer with over 15 years of experience designing, prototyping, and building custom automation and motion-based electromechanical systems from the ground up. Proven expertise in generating and iterating on complex robotic systems, from precision motion and manipulation to full system integration and bring-up. Skilled in integrating microcontrollers, PLCs, sensors, and actuators to deliver robust solutions for advanced manufacturing challenges. A passionate problem-solver committed to owning the entire project lifecycle, from welding and wiring to firmware and final commissioning.

# Key Skills & Areas of Expertise

* **CAD/CAE:** SolidWorks, Inventor, Siemens NX, AutoCAD, Fusion 360, Catia
* **Simulation & Design:** FEA (SolidWorks), 3DS MAX, Tolerancing, GD&T, DFM/DFA
* **Controls & Electrical:** PLC/HMI Programming (Siemens TIA Portal - **Advanced Ladder**), Microcontroller Programming (**Arduino**, Raspberry Pi - **Intermediate Python**), PID Control, EPLAN, Sensor & Actuator Integration, Electrical Panel Design
* **Prototyping & Fabrication:** 3D Printing (FDM/SLA), CNC Machining, Sheet Metal Design & Bending, Welding (Mechanical & Electrical Components), System Assembly & Bring-up
* **Project & Documentation:** MS Project, Google Workspace, BOMs, 2D/3D Layouts, Schematics

# Professional Experience

**SIMA Projetos e Soluções Industriais – Belo Horizonte, Brazil**

*Co-Founder & Engineering Director* | 2016 – Present

Designed, built, and commissioned custom automation systems from concept to final product, leading the mechanical and electromechanical development for clients in healthcare, automotive, and advanced manufacturing.

* Personally handled end-to-end hands-on execution, including mechanical assembly, component welding, electrical panel wiring, and on-site equipment commissioning.
* Engineered and iterated on machines and subsystems for fabrication, focusing on integrating mechanical structures with custom control systems, sensors, and actuators.
* Led multidisciplinary squads as a development leader, fostering a hands-on, collaborative environment focused on rapid prototyping and practical, functional solutions.

**Highlighted Automation Projects:**

* **Autonomous UVC Disinfection Robot**
  + Challenge: Develop a fully autonomous robotic system for pathogen disinfection in critical environments during the pandemic.
  + My Contribution: As development leader, I designed the complete mechatronic system, integrating an Omron AMR platform with custom sensor arrays (LIDAR, vision) and Arduino-based controls. Personally handled the 3D modeling, weight distribution analysis, and initial firmware programming for sensor and safety system integration.
* **UV Curing System for Metal Printing (CMP Project)**
  + Challenge: Create a high-performance UV curing system for a metal printing line, requiring precise control over multiple physical parameters.
  + My Contribution: Executed the complete mechanical and electrical design and programmed the Siemens PLC and HMI from scratch. The system included PID loops for LED temperature management, hydraulic flow control for the cooling system, and variable current control for the electrical panel fans, all compliant with NR-12 safety standards.
* **Compact UV Curing System for Offset Press (Astergraf Project)**
  + Challenge: Integrate a UV curing system into a high-speed printing press with an extremely constrained space, requiring operation within a 2mm tolerance of moving components.
  + My Contribution: Designed and prototyped an ultra-compact, water-cooled LED module housing and developed custom hydraulic connections that were unavailable on the market at the required size. Iterated on the design using 3D printing and mockups to validate fit and function before final fabrication.
* **Arduino-Based UV Curing Conveyor**
  + Challenge: The client needed a cost-effective, automated conveyor system for a new production process involving instant adhesives, requiring precise UV radiation exposure and operator safety.
  + My Contribution: I developed the complete end-to-end solution. This included the 3D/2D mechanical design of the conveyor and its safety enclosures; hardware selection; and the development of the control system using an Arduino and a touch screen. I personally programmed the control logic and the interactive user interface, assembled and commissioned the electronics, and oversaw the final try-out at the client's facility. A key technical challenge was designing the conveyor mechanics to handle slender, lightweight products without tipping, while ensuring the safe integration of industrial UV emitters with the Arduino controller.

**AC Implementos Rodoviários – Contagem, Brazil**

*Project Manager* | 2014 – 2016

* Directed the design of mechanical subsystems for trailers and road equipment, including hydraulic, locking, and suspension systems.
* Optimized parts for manufacturability (DFM) and reduced costs through component standardization.
* Coordinated with suppliers and internal teams during prototype testing and full-scale production.

**Fourmec Industrial – Belo Horizonte, Brazil**

*Managing Partner & Co-Founder* | 2008 – 2014

* Led the design and manufacturing of custom machinery for clients in food processing, packaging, and logistics.
* Developed automated platforms compatible with ABB/Fanuc robots and integrated pneumatic and hydraulic components to deliver turnkey solutions.

**PERSONAL PROJECTS & HANDS-ON PASSION**

My passion for building extends beyond my professional work. I frequently apply engineering principles to create custom solutions from scratch, moving from concept sketch to CAD and final fabrication in my own workshop.

* **Custom Montessori Bed:** Designed a unique cloud-shaped Montessori bed in SolidWorks, created detailed fabrication drawings in AutoCAD, and personally built it to meet a specific vision that was unavailable on the market.
* **Walk-in Toy House:** Engineered and constructed a custom walk-in toy house for my niece, managing the project from initial design to final assembly.
* **Therapeutic Game for Social Project:** Modeled a therapeutic game in Autodesk Inventor, detailed laser-cut components in AutoCAD, and sliced the models for 3D printing to support a university social project for the elderly and individuals with learning difficulties.

# Education

**Bachelor of Science in Mechanical Engineering**

Centro Universitário de Belo Horizonte (UNIBH), Brazil – 2021

# Certifications

**Basic Python Programming – Certificate of Completion, 2021**

Acquired foundational skills in Python for engineering applications, including scripting, logic, and basic automation tasks.

**NR-12 Machinery Safety Certification** **– Certificate of Completion, 2021**

Certified in Brazilian industrial safety standard (Comparable to OSHA standards – Emphasizes safe machine design, guarding, ergonomics, and operator training).

# Languages

**Portuguese:** Native

**English:** Fluent

**Spanish:** Working proficiency (actively improving)