

# LUCAS MARIANO GRIGOLATO

## FPGA DESIGN & TELECOMMUNICATIONS ENGINEER

 lucasmarianogrigo@[gmail.com](mailto:lucasmarianogrigo@gmail.com) ◊  Helmond, The Netherlands

 [linkedin.com/in/lucas-grigolato](https://www.linkedin.com/in/lucas-grigolato) ◊  [github.com/grigosback](https://github.com/grigosback)

### EXPERIENCE

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#### TMC Electronics [1]

*FPGA Engineer*

Dec 2022 - Now

*Eindhoven, The Netherlands*

Currently working as a consultant for Ericsson (Sweden) on high-capacity wireless communication projects within the MINI-LINK organization.

- Designed and implemented FPGA cores and device firmware for various high-capacity wireless communication projects.
- Used High-Level Synthesis (HLS) to develop IP cores from C++ behavioral descriptions and to improve the quality of results (QoR) of the existing IP cores library.
- Migrated HLS IP cores from Vitis HLS to Catapult HLS.
- Developed C++ software to interface CPUs with custom FPGA designs.
- Implemented acceptance tests for FPGA designs and individual IP cores.
- Automated workflows and the CI/CD environment using Make, Python, and Bash scripts.

#### Emtech S.A. [2]

*FPGA Design Engineer*

Oct 2020 - Nov 2022

*Rosario, Argentina*

Designed, verified, and implemented FPGA cores and device firmware for satellite communication projects.

- Developed FPGA cores for digital signal processing and control logic.
- Created low-level firmware for custom hardware interfaces.
- Designed and implemented communication protocols.
- Verified and validated simulation models for FPGA and system-level performance.
- Applied design guidelines specific to space communication systems (e.g., reliability, radiation tolerance, redundancy, error detection and correction).

#### Centro de Innovación Tecnológica [3]

*Instructor*

Mar 2016 - Jul 2017

*Rosario, Argentina*

Worked as an IT course instructor at Fundación Libertad.

- *Cloud Management with GSuite* – 80 hours (Empleartec Program).
- *Cisco IT Essentials* – 80 hours.
- *Microsoft Excel, Advanced Level* – 12 hours (taught across 6 editions).

#### Consulado General de Chile en Rosario [4]

*IT Support Manager*

Sep 2013 - Jul 2017

*Rosario, Argentina*

- Managed Help Desk team of 7 employees.
- Maintained and repaired computer hardware.
- Acted as liaison between the Chilean government and the consulate for the implementation of new IT solutions.
- Implemented, administered, and managed computer network infrastructures.
- Performed advanced software and hardware troubleshooting.
- Provided remote technical support.

- Managed Help Desk operations for 30 employees.
- Maintained and repaired computer hardware.
- Implemented, administered, and managed computer network infrastructures.
- Performed advanced software and hardware troubleshooting.
- Administered GSuite environment and user accounts.
- Managed web hosting services and domain configurations.
- Provided remote technical support.
- Administered Active Directory on Windows Server 2008.

## KEY PROJECTS

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### MINI-LINK

*Ericsson*

Dec 2022 - Now

Focused on applying the High-Level Synthesis (HLS) paradigm to improve the quality of results of the IP cores used in the MINI-LINK product family. Developed an abstraction layer enabling the same C++ codebase to be used with both Vitis HLS and Catapult HLS, allowing exploration of different targets with unified source code. Contributed to power and area optimization, latency reduction, and throughput improvements by following HLS best practices. Additionally, developed MATLAB acceptance tests for FPGA designs and IP cores, validating algorithm behavior using floating-point and fixed-point libraries.

### BlueWalker 3

*AST SpaceMobile*

Feb 2021 - Dec 2022

Designed and refactored communication, control, and design-for-testability (DFT) logic for the Microns blocks used in satellite systems. This included digital and analog front ends, LTE communication links, and beamforming components.

### V\*Ger

*Skyloom Global Corp.*

Oct 2020 - Oct 2021

Designed and developed communication cores and control logic for an optical communication terminal used in satellite systems. Created and executed acceptance tests for the associated electronic boards.

### Digital beamformer for the reception of satellite signals

*Telecommunications Engineering Department, Centro Atómico Bariloche*

Aug 2019 - Dec 2020

Analyzed and implemented digital beamforming techniques using an antenna array for signal reception, focusing on the MUSIC and ESPRIT direction-of-arrival estimation algorithms. Developed signal count-estimation methods, including an SVM-based implementation. Proposed and designed a beamforming system architecture for deployment on a CIAA-ACC development board, distributing functionality between the FPGA and microprocessor. Implemented the complete system in GNU Radio and validated its operation through Python-based simulations.

## HLS OUTREACH & KNOWLEDGE SHARING

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With extensive experience working with the HLS paradigm, I delivered the following presentations and talks, sharing practical insights, examples, and demonstrations:

**25/09/2023 - HLS Pizza Session @ TMC Electronics:** Introduction to HLS for 40 participants, including a demo of an FFT implementation in Vitis HLS.

**26/04/2024 - Introduction to HLS @ Instituto Balseiro:** Taught a four-hour class on the HLS paradigm and workflow to Telecommunications Engineering students.

**03/12/2024 - Experiences with HLS @ IMEC:** Presented to IMEC's DSP team on HLS benefits and practical applications in their projects.

## EDUCATION

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### Instituto Balseiro (UNCuyo) [6]

*Telecommunications Engineering*

Jul 2017 - Dec 2020

*San Carlos de Bariloche, Argentina*

- 5.5-year program.
- Comisión Nacional de Energía Atómica scholarship for undergraduate students.
- Final Project: *Digital beamformer for the reception of satellite signals* @ Telecommunications Engineering Department, Centro Atómico Bariloche.

### Facultad de Cs. Exactas, Ingeniería y Agrimensura (UNR)

*Electronic Engineering*

Feb 2009 - Jul 2017

*Rosario, Argentina*

- 5-year program, three years completed.
- Obtained a Bachelor's degree.

## VOLUNTEER EXPERIENCE

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### TMC Works Council (OR)

*IT Committee Member*

October 2023 - Now

*Eindhoven, The Netherlands*

- Advised on multiple IT projects implemented by the company's IT department
- Provided input and feedback to ensure projects positively impacted employees
- Collaborated with council members and IT teams to align technology solutions with employee needs
- Monitored IT initiatives from a user and organizational perspective to improve adoption and effectiveness

### Centro de Estudiantes del Instituto Balseiro

*IT Secretary*

Apr 2019 - Dec 2020

*San Carlos de Bariloche, Argentina*

- Elected by vote in 2019 and 2020.
- Provided Help Desk support for  $\approx$  200 students.
- Administered, maintained, and managed file and web servers.
- Implemented and supported VPN solutions.
- Acted as liaison between students and institute authorities on IT-related matters.
- Managed IT-related purchases and vendor coordination.

## SKILLS

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### Programming & HDL

HLS, C++, C, SystemVerilog, VHDL, Python, MATLAB, Machine Learning

### Tools & IDEs

Vivado, Libero SoC, Vitis, Vitis HLS, Catapult HLS, Jenkins, Visual Studio Code, GNU Radio, Cisco Packet Tracer, Proxmox, VMware, VirtualBox, CST Studio, ADS.

### Version control & PM

GitLab, Github, Jira.

### FPGA

Zynq-7000 SoC, Microsemi ProASIC3, Kintex UltraScale, Zynq UltraScale+ RFSoC.

### Verification

UVM, Questa Sim, VCS.

### Documentation

LATEX, Markdown, Doxygen.

### Networking

CCNA R&S (Level 2), pfSense, MikroTik, OpenVPN, WireGuard, Squid, Socket API.

### Telecommunications

Optical/RF/Wireless/Analog/Digital/Satellite Communications, Fundamentals of Optical Fibers, DSP, Statistical Signal Processing, Software Defined Radio, Beamforming.

### Operating Systems

Microsoft Windows, Linux, Cisco IOS, RouterOS.

### Languages

English (Professional), Spanish (Native), Dutch (Basic).

## REFERENCES

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[1] **TMC Electronics**

- Tom Blaauw, Senior Business Manager, TMC Electronics

[2] **Emtech S.A.**

- Ing. Guillermo Güichal, CEO, Emtech S.A.

[3] **Centro de Innovación Tecnológica**

- Ing. Sebastián Bosch, Director, Centro de Innovación Tecnológica, Fundación Libertad

[4] **Consulado General de Chile en Rosario**

- Mrs. Arely Mella Contreras, Minister of Faith and Authorized Secretary, Consulado General de Chile en Rosario

[5] **Fundación Libertad**

- Mr. Gerardo Bongiovanni, President, Fundación Libertad
- Lic. Ana Figueroa Casas, Director, Escuela de Negocios, Fundación Libertad

[6] **Instituto Balseiro**

- Dr. Diego Grosz, Head of Department, Telecommunications Engineering, Centro Atómico Bariloche
- Dr. Santiago Hernandez, Final Project Advisor, Telecommunications Engineering, Centro Atómico Bariloche