Lucas MATANA LUZA

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Education

2018–2021 **Ph.D. in Automatic and Microelectronic Systems**
École Doctorale Information Structures Systêmes (I2S)
University of Montpellier (UM)
Montpellier, France
Thesis: Analysis of space and atmospheric radiation-induced effects on memory devices

2017–2019 **Master in Electrical Engineering**
Graduate Program in Electrical Engineering (PPGEEL)
Universidade Federal de Santa Catarina (UFSC)
Florianópolis - SC, Brazil
Thesis: A contribution to the in-orbit validation of a radiation-hardened communication platform to be used in small satellites

2012–2017 **Bachelor in Electrical Engineering**
Electrical Engineering
Universidade de Passo Fundo (UPF)
Passo Fundo - RS, Brazil
Thesis: Electroencephalogram acquisition module

Experience

01/2022–actual **LIRMM - CNRS**
Montpellier, France

Engineer

- Research involving analysis of space and atmospheric radiation-induced effects on electronic devices.
- Testing and characterization of electronic devices under radiation.
- Software development for data analysis.
- Development of controller systems based on FPGAs and microcontrollers.
- Development of printed circuit board projects.

11/2018–12/2021 **LIRMM - University of Montpellier (UM)**
Montpellier, France

Ph.D. Researcher

- Research involving analysis of space and atmospheric radiation-induced effects on electronic devices.
- Testing and characterization of electronic devices under radiation.
- Software development for data analysis.
- Development of controller systems based on FPGAs and microcontrollers.
- Development of printed circuit board projects.

03/2017–11/2018 **SpaceLab - UFSC - CAPES**
Florianópolis - SC, Brazil

Master Researcher

- Implementation of a communication platform based on an emerging radiation-hardened device to be used in small satellites.
- Integration concept of a scientific experience named Payload-X for the FloripaSat-1 CubeSat.

10/2015–08/2016 **Sigma Electrical Equipments**
Lagoa Vermelha - RS, Brazil

Trainee

- Development of automation projects for the industry.
- Technical support to the electrical systems of the industrial machinery.
- Test and validation of electrical transformers.

03/2011–09/2016 **Diula Center**
Lagoa Vermelha - RS, Brazil

Manager

- Sales and purchasing management.
- Stock control implementation.
- Financial assistant.
- Customer service management.

Projects

2021-Actual **Investigation on Intra-Die Variability and Radiation-Induced SEL in a COTS SRAM Memory Flying on Proba-V**
- Project management.
- Hardware development for the test setup with a focus on a current/voltage monitoring system for Single-Event Latch-Up detection.
- Software development for test setup based on Python scripts to handle a live data visualization during the testing.
- Device testing under heavy-ion radiation to be carried out at RADEF.
- Software development for data analysis based on Python scripts for data correlation and radiation-induced events classification.

2018-Actual **MTCube - Memory Test CubeSat**
- Test and validation of the RES payload.
- Development of a real-time monitoring system based on Django (Python web framework) to follow the in-flight scientific data generated by the payload.

2020-Actual **A Model-Based Framework for the Reliability Assessment of Safety-Critical Applications based on Artificial Neural Networks**
- PCB desing for hosting a DDR Self-Refresh DRAM (HyperRAM) to be integrated with the ZedBoard development kit using the FMC Interface.
- Implementation of a HyperBus memory controller for the Zynq-7000 System-on-Chip.
- Implementation of the LeNet-5 Convolutional Neural Network on the Zynq-7000 System-on-Chip using C language.
- Development of the test setup for radiation test campaigns under atmospheric-like neutorn beam at ChipIr.
- Software development for data analysis based on Python scripts.

2019 **Payload-X**
- NG-Medium FPGA implementation (VHDL, and NanoXplore tools) of a communication platform based on the CCSDS protocols to enable an in-orbit validation of the device.
- Integration concept with the FloripaSat-1 CubeSat.

Academic Publications

2021 Journal **Emulating the Effects of Radiation-Induced Soft-Errors for the Reliability Assessment of Neural Networks**
L. Matana Luza, A. Ruospo, D. Söderström, C. Cazzaniga, M. Kastriotou, E. Sanchez, A. Bosio and L. Dilillo
IEEE Transactions on Emerging Topics in Computing, Oct. 2021. [Early Access]
https://doi.org/10.1109/TETC.2021.3116999

2021 Journal **Neutron-Induced Effects on a Self-Refresh DRAM**
L. Matana Luza, D. Söderström, H. Puchner, R. G. Alía, M. Letiche, C. Cazzaniga, A. Bosio and L. Dilillo
Microelectronics Reliability, Volume 128, 2022
https://doi.org/10.1016/j.microrel.2021.114406

2021 Journal **On the Evaluation of FPGA Radiation Benchmarks**
G. Bricas, G. Tsiligiannis, A. Touboul, J. Boch, M. Kastriotou, C. Cazzaniga, C. D. Frost, L. Dilillo, **L. Matana Luza**
Microelectronics Reliability, Volume 126, 2021.
https://doi.org/10.1016/j.microrel.2021.114276

2021 Journal **Reliability Analysis of a Fault-Tolerant RISC-V System-on-Chip**
D. A. Santos, **L. Matana Luza**, L. Dilillo, C. A. Zeferino, and D. R. Melo
Microelectronics Reliability, vol. 125, pp. 114346, Oct. 2021
https://doi.org/10.1016/j.microrel.2021.114346

2021 Journal **Electron-Induced Upsets and Stuck Bits in SDRAMs in the Jovian Environment**
D. Söderström, **L. Matana Luza**, H. Kettunen, A. Javanainen, W. Farabolini, A. Gilardi, A. Coronetti, C. Poivey, and L. Dilillo
IEEE Transactions on Nuclear Science, vol. 68, no. 5, pp. 716–723, May 2021.
https://doi.org/10.1109/TNS.2021.3068186

2021 Symposium **Pros and Cons of Fault Injection Approaches for the Reliability Assessment of Deep Neural Networks**
A. Ruospo, **L. Matana Luza**, A. Bosio, M. Traiola, L. Dilillo and E. Sanchez
2021 IEEE Latin American Test Symposium (LATS), Oct. 2021.
https://doi.org/10.1109/LATS53581.2021.9651807

2021 Conference **Technology Impact on Neutron-Induced Effects in SDRAMs: A Comparative Study**
L. Matana Luza, D. Söderström, A. M. P. de Mattos, E. A. Bezerra, C. Cazzaniga, M. Kastriotou, C. Poivey and L. Dilillo
2021 16th International Conference on Design & Technology of Integrated Systems in Nanoscale Era (DTIS), Montpellier, France, Jun. 2021, pp. 1-6.
https://doi.org/10.1109/DTIS53253.2021.9505143

2021 Conference

Characterization of a RISC-V System-on-Chip under Neutron Radiation

D. A. Santos, **L. Matana Luza**, M. Kastriotou, C. Cazzaniga, C. A. Zeferino, D. R. Melo, and L. Dilillo
2021 16th International Conference on Design & Technology of Integrated Systems in Nanoscale Era (DTIS), Montpellier, France, Jun. 2021, pp. 1-6.
https://doi.org/10.1109/DTIS53253.2021.9505054

2021 Symposium

A Model-Based Framework to Assess the Reliability of Safety-Critical Applications

L. Matana Luza, A. Ruospo, A. Bosio, E. Sanchez, and L. Dilillo
2021 24th International Symposium on Design and Diagnostics of Electronic Circuits and Systems (DDECS), Vienna, Austria, Apr. 2021, pp. 41-44
https://doi.org/10.1109/DDECS52668.2021.9417059

2020 Conference

Electron-Induced Upsets and Stuck Bits in SDRAMs in the Jovian Environment

D. Söderström, **L. Matana Luza**, H. Kettunen, A. Javanainen, W. Farabolini, A. Coronetti,C. Poivey, and L. Dilillo
2020 IEEE Nuclear and Space Radiation Effects Conference (NSREC), Nov. 2020.

2020 Symposium

Investigating the Impact of Radiation-Induced Soft Errors on the Reliability of Approximate Computing Systems

L. Matana Luza, D. Söderström, G. Tsiligiannis, H. Puchner, C. Cazzaniga, E. Sanchez, A. Bosio, and L. Dilillo
IEEE International Symposium on Defect and Fault Tolerance in VLSI and Nanotechnology Systems (DFT), Frascati, Italy, 2020, pp. 1-6
https://doi.org/10.1109/10.1109/DFT50435.2020.9250865

2020 Conference

Effects of Thermal Neutron Irradiation on a Self-Refresh DRAM

L. Matana Luza, D. Söderström, H. Puchner, R. G. Alía, M. Letiche, A. Bosio, and L. Dilillo
15th Design Technology of Integrated Systems in Nanoscale Era (DTIS), Marrakech, Morocco, Apr. 2020, pp. 1–6
https://doi.org/10.1109/10.1109/DTIS48698.2020.9080918

2020 Conference

A Low-Cost Fault-Tolerant RISC-V Processor for Space Systems

D. A. Santos, **L. Matana Luza**, C. A. Zeferino, L. Dilillo, and D. R. Melo
15th Design Technology of Integrated Systems in Nanoscale Era (DTIS), Marrakech, Morocco, Apr. 2020, pp. 1–6
https://doi.org/10.1109/10.1109/DTIS48698.2020.9081185

2019 Symposium

Effects of Heavy Ion and Proton Irradiation on a SLC NAND Flash Memory

L. Matana Luza, A. Bosser, V. Gupta, A. Javanainen, A. Mohammadzadeh, and L. Dilillo
IEEE International Symposium on Defect and Fault Tolerance in VLSI and Nanotechnology Systems (DFT) Noordwijk, Netherlands, Oct. 2019, pp. 1–6
https://doi.org/10.1109/10.1109/DFT.2019.8875475

2019 Conference

Vertical Line Fault Mechanism Induced by Heavy Ions in an SLC NAND Flash

V. Gupta, A. Bosser, **L. Matana Luza**, D. Söderström, A. Javanainen, H. Kettunen, J. Praks, A. Virtanen, and L. Dilillo
19th European Conference on Radiation and Its Effects on Components and Systems (RADECS), Montpellier, France, Sept. 2019

2019 Workshop

Stuck and Weakened SDRAM Cells Due to Heavy-Ion Irradiation

D. Söderström, **L. Matana Luza**, A. Bosser, T. Gil, K. Voss, H. Kettunen, A. Javanainen, and L. Dilillo
Data Workshop in 2019 19th European Conference on Radiation and Its Effects on Components and Systems (RADECS), Montpellier, France, Sept. 2019

2019 Workshop

Design and Implementation of a Flexible Interface for TID Detector

I. Fara, **L. M. Luza**, J. Boch, G. Furano, M. Ottavi, and L. Dilillo
IEEE 8th International Workshop on Advances in Sensors and Interfaces (IWASI), Otranto, Italy, Jun. 2019, pp. 158–162
https://doi.org/10.1109/10.1109/IWASI.2019.8791299

2019 Symposium

A Fault-Tolerant Reconfigurable Platform for Communication Modules of Satellites

C. A. Rigo, **L. Matana Luza**, E. D. Tramontin, V. Martins, S. V. Martinez, L. K. Slongo, L. O. Seman, L. Dilillo, F. L. Vargas, and E. A. Bezerra
IEEE Latin American Test Symposium (LATS), Santiago, Chile, May 2019, pp. 1–6
https://doi.org/10.1109/10.1109/ LATW.2019.8704551

2018 Congress

Design of an EEG Acquisition System Based on Front-End ADS1292

L. Matana Luza, F. R. Andreis, and A. F. Balotin
XXVI Brazilian Congress on Biomedical Engineering, Búzios, Brazil, Oct. 2018, pp. 425-430
https://doi.org/10.1007/978-981-13-2119-1_65

2018 Workshop

Enabling Deep-Space Cubesat Missions Through State-of-the-Art Radiation-Hardened Technologies

L. Matana Luza, C. A. Rigo, E. D. Tramontin, V. M. G. Martins, S. V. Martínez, L. K. Slongo, L. O. Seman, L. Dilillo, and E. Bezerra
3rd IAA Latin American CubeSat Workshop (IAA-LACW), Ubatuba, Brazil, Dec. 2018

2016 Event

Electroencephalogram Signal Acquisition Module

Original title: Módulo de Aquisição de Sinais de Eletroencefalograma
L. Matana Luza and A. Balotin
III Semana do Conhecimento (UPF), Passo Fundo, Brazil, Oct. 2016
http://semanadoconhecimento.upf.br/download/anais-2016/engenharias/lucas-matana-luza-modulo.pdf

2016 Congress

Monitoring Humidity and Temperature with a Raspberry PI 3

Original title: Monitoramento de Umidade e Temperatura via Raspberry PI 3
V. J. Petry, G. Benedetti, **L. Matana Luza**, L. Arpini, N. B. Nicoli, J. M. Levandoski
II Congresso Internacional de Gestão, Tecnologia e Inovação da URI (CONIGTI) & III Congresso Sul-Brasileiro de Engenharia de Alimentos (CSBEA), Erechim, Brazil, Sept. 2016.

2016 Congress

Power Inverters Using Sinusoidal PWM Modulation Technique

G. Benedetti, J. C. S. da Silva, **L. Matana Luza**, L. H. Arpini, V. J. Petry, E. S. Acco
Congresso Regional de Iniciação Científica e Tecnológica em Engenharia, Joinville, Brazil, Jul. 2016
http://cricte.com.br/2016/artigos/CRICTE_2016_paper_29.pdf

Awards

10/2020 **Outstanding Student Paper**
Work: *Investigating the Impact of Radiation-Induced Soft Errors on the Reliability of Approximate Computing Systems*
Organization: *33nd IEEE International Symposium on Defect and Fault Tolerance in VLSI and Nanotechnology Systems*

10/2019 **Outstanding Student Paper**
Work: *Effects of Heavy Ion and Proton Irradiation on a SLC NAND Flash Memory*
Organization: *32nd IEEE International Symposium on Defect and Fault Tolerance in VLSI and Nanotechnology Systems*

Languages

Portuguese
Native language

English
Proficient

French
Conversational

Skills

Programming Languages
C, Python, VHDL, HTML, CSS.

Web Frameworks
Django.

Tools
Vivado, Vitis, Eclipse, Quartus, Libero, NXmap, Eagle.