Del Algoritmo al Hardware:
Aprendizaje Automático en Sistemas Embebidos

From Algorithm to Hardware: Machine Learning in Embedded Systems

1 al 11 de Abril, 2025. Universidad Nacional de Mar del Plata - Mar del Plata - Argentina.

UNIVERSIDAD NACIONAL DE MAR DEL PLATA

FACULTAD DE INGENIERÍA

El secretario académico de la Facultad de Ingeniería, Dr. Omar Gustavo Zabaleta certifica que

Demian Nehuel, MOZO

ha aprobado el curso denominado "*Del Algoritmo al Hardware: Aprendizaje Automático en Sistemas Embebidos*",
a cargo de Romina Soledad Molina, Ph.D y Nikola Jovalekic, Ph.D.,
con la participación del Ing. Maynor Ballina y del Dr.Gustavo Sutter.
La duración del curso fue de 46 hs y fue dictado del 1 al 11 de abril de 2025.

Mar del Plata, 22 de Abril de 2025

Romina Soledad Molina, Ph.D.
MLab-STI, ICTP

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Sec. Académico, FI
Universidad Nacional de Mar del Plata

Dra. Luciana de Micco
Profesora, Facultad de Ingeniería
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Universidad Nacional de Mar del Plata
Facultad de Ingeniería
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FUNDACIÓN WILLIAMS

Programa

- **Machine Learning and FPGA:** Evolution and current state of these technologies. Edge AI. Machine learning: From theory to practice.

- Model Compression For Machine Learning-based Models: Pruning, Quantization, and Knowledge Distillation. Definition. Integration of the different techniques. Benefits and drawbacks.

- **System-On-Chip based on FPGA:** SoC/FPGA features and architecture. SoC/FPGA for ML-based acceleration. Hardware design flow.

- **High-Level Synthesis:** Bridging software and hardware. Overview HLS, basic considerations. Definition and utilization of optimizations (Pragma) in IP core design flow.

- **Communication Block and HyperFPGA:** Enhancing education with remote laboratory access. ComBlock as communication block between FPGA and Processing System. HyperFPGA: heterogeneous computing, development workflow

- **High-Level Synthesis for Machine Learning (hls4ml):** Bridging machine learning and FPGAs for ultra-fast inference. Workflow for deep neural network deployment on embedded architectures.

- Embedded Platforms for Machine Learning: Overview of embedded platform architectures and key hardware components, methodological approach to designing embedded platforms. Practical hardware design consideration, managing power integrity issues. Addressing signal integrity challenges, optimizing electromagnetic compatibility (EMC) and mitigating electromagnetic interference (EMI).

- Invited talk: AI Engines from AMD Xilinx.

DURACIÓN: Todos los días del 1 al 11 de abril de 2025. Carga horaria total 46 horas.
MODALIDAD DEL DICTADO: Teorías de manera on-line y presencial. Laboratorios de manera presencial.