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Laboratoire Européen pour la Physique des Particules
European Laboratory for Particle Physics

Mail address: Dr. Benjamin Todd,
Section Leader – Converter Controls Electronics
CERN, TE Department,
Meyrin, GENEVA 23,
Switzerland, 1211-CH.

Telephone Direct: +41 (22) 766 2676
CERN Exchange: +41 (22) 767 6111
E-mail: benjamin.todd@cern.ch

Geneva, October 15th 2019

Re: Reference Letter M. Nordgard

To Whom It May Concern:

Magna NORDGARD undertook a work placement at CERN, as an undergraduate student from 1st September 2015 to 31st May 2016. Magna worked within the power converter controls electronics section (TE/EPC/CCE), designing programmable logic used in power converter controls electronics.

The converter controls electronic section designs, produces and operates electronic modules used in power converters throughout CERN's accelerator complex. The section is responsible for several classes of module, one of the core classes consists of regulation boards, implementing closed-loop control. These exist in two main variants, DSP-based, and FPGA-based.

Magna worked on the redesign of a FPGA-based regulation board, *SIRAMATRIX*. The scope of Magna's work concerned the RTL implementation of a Spartan 6 LX45 FPGA. Magna was charged with refactoring an existing design to create a modular, extensible, re-useable implementation. At the time of Magna's arrival only a few use cases of SIRAMATRIX existed, many variations were planned, so programmable logic refactoring became critical for this design.

The reference design for the SIRAMATRIX was undocumented, Magna begun her work with a review of the design, and Magna worked with the lead engineer to understanding the functions implemented. Magna then produced a template proposing a refactored design, before implementing several types of RTL entities, using VHDL. Magna's principal designs included multiply accumulate logic, an interface to an SAR ADC and an interface to an R-2R DAC.

Magna worked from the template, refactoring entities, then developed RTL entities in a generic manner, and added them to the section version control system as "common" IP cores. These were designed to be reused throughout the section, in other programmable logic designs. Since Magna's departure these cores have been used in other designs for the section, and her work set the baseline for the complete refactoring of the FPGA-based regulation boards.

On a more personal level, Magna was a pleasure to work with during her time here; being extremely well appreciated by her colleagues, having an out-going and inclusive personality. Magna worked hard to produce a baseline for the new design, and showed great enthusiasm for RTL design. Magna has an excellent career ahead of her in programmable logic engineering.

Best regards,

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Benjamin TODD (Dr.)