OpenCL implementation of an adaptive disruption predictor based on a probabilistic Venn classifier

Disruption prediction in fusion devices (JET)

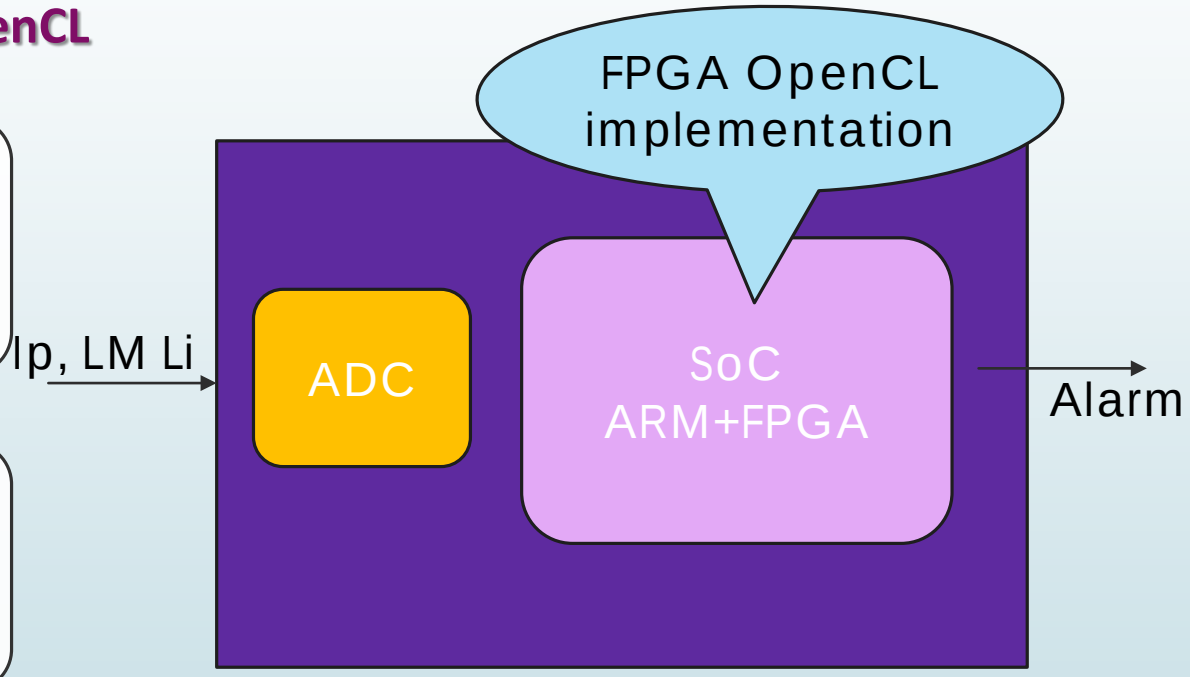
- Use of an standalone system with a System On Chip (ARM+FPGA)
- Implemented using OpenCL

The challenge

- Response time < 1ms
- Implementation using OpenCL for the ARM processor and for the FPGA
- Implementation of OpenCL Board Support Package including an ADC

The solution

- Embedded FPGA-based architecture using a SoC (Cyclone V)
- Deterministic response time. Prediction of the disruption in 400us.
- Implementation of the prediction model in a GPU to shorten the execution time using OpenCL



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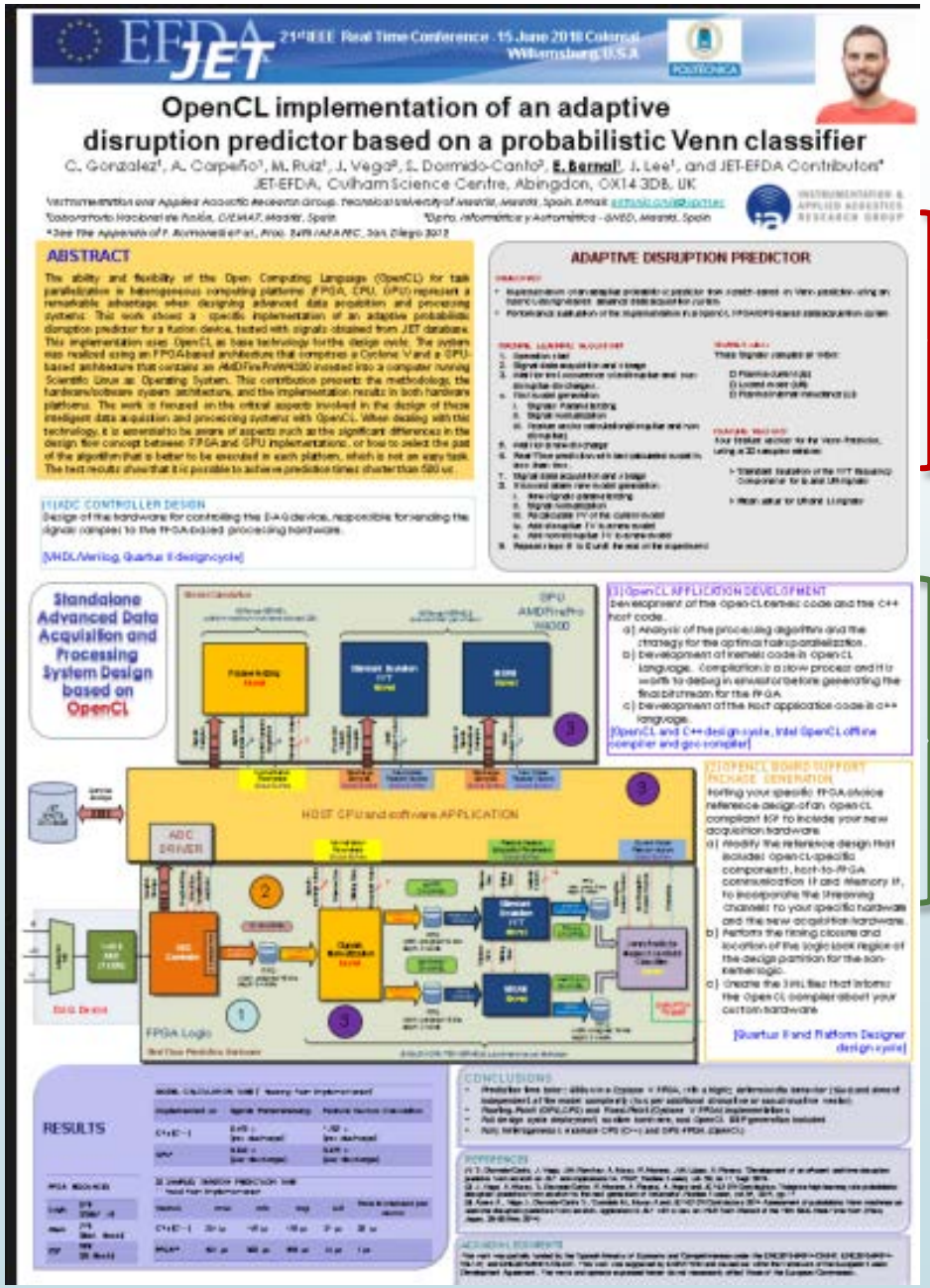

Abstract

Initial MATLAB algorithm with the Venn Probabilistic Classifier

System architecture solution

- Using a SoC (Cyclone V)
- A Linux host

Implementation of the Board Support Package for OpenCL

Results: Execution Time

Conclusions

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