Name	Degree	% participation
António Joaquim Nunes Batista	Ph.D. researcher	100%

Part I – Scientific Activities

Participation in the ITER project

Summary and highlights of research achievements

Development of an ATCA/AXIe blade designed for Fast Control and Data Acquisition Systems.

The blade is compatible with PICMG 3.0/3.4 and AXIe specifications, comprises a passive RTM for rear IO connectivity to ease hot-swap maintenance and simultaneously to increase cabling life cycle. Also includes PICMG 3.0/3.4 redundancy support, in order to provide high levels of system reliability and availability.

Is a high channel number IO board with galvanic isolation and FPGA based processing. Simultaneously digitized data from all ADCs of the board can be filtered/decimated in the FPGA, decreasing data throughput, increasing resolution, and sent through PCI Express to multi-core processors in the ATCA shelf hub slots. Concurrently the multi-core processors can update the board DACs in real-time. Full-duplex point-to-point communication links between all FPGAs, of peer blades inside the shelf, allow the implementation of distributed algorithms and MIMO systems. Support for several Timing and Synchronization architectures is provided.

Figures show the board FPGA firmware block diagram, board block diagram and the board interconnections inside the shelf.

Some key features:

1. Onboard ADC or DAC modules (or a combination of both) with galvanic isolation;
2. Xilinx Virtex 6 FPGA;
3. DDR3 SODIMM memory;
4. CompactFLASH memory card;
5. Intelligent Platform Management Controller;
6. Two PCI express ×4 (generation 2) ATCA Fabric channels (dual-star topology support);
7. Eleven Xilinx Aurora ×1 (or other ATCA compatible communications protocol) ATCA Fabric channels (full-mesh topology support);
8. Two Fast Ethernet (IEEE1588-V2 and LXI compatible) ATCA Base channels (dual-star topology support);

9. Timing and Synchronization support.

Part II – Scientific Output

A. Publications

Papers in international refereed scientific journals

Author(s)	Miguel Correia, Jorge Sousa, António P. Rodrigues, Álvaro Combo, António J.N. Batista, Bruno Gonçalves, Carlos A.F. Varandas, Carlos M.B.A. Correia
Paper title	xTCA-compliant PCIe hub/controller for Physics CODAC subsystems
Journal name	Fusion Engineering and Design
Volume, page	86, Issues 6-8, 1351-1354
Year	2011

Author(s)	Miguel Correia, Jorge Sousa, António P. Rodrigues, Álvaro Combo, António J.N. Batista, Bruno Gonçalves, Carlos A.F. Varandas, Carlos M.B.A. Correia
Paper title	ATCA-Based Hardware for Control and Data Acquisition on Nuclear Fusion Fast Control Plant Systems
Journal name	Nuclear Science, IEEE Transactions on
Volume, page	58 Issue:4, 1701 - 1705
Year	2011

Author(s)	B. Gonçalves, J. Sousa, B.B. Carvalho, A.P. Rodrigues, M. Correia, A. Batista, J. Vega, M. Ruiz, J.M. López, R. Castro, A. Wallander, N. Utzel, P. Makijarvi, S. Simrock, A. Neto, D. Alves, D.F. Valcárcel, P. Lousã, F. Piedade, L. Fernandes, et al.
Paper title	ITER prototype fast plant system controller
Journal name	Fusion Engineering and Design
Volume, page	86, Issues 6-8, 556-560
Year	2011

Author(s)	B. Goncalves, J. Sousa, B.B. Carvalho, A.P. Rodrigues, M. Correia, A. Batista, J. Vega, M. Ruiz, J.M. Lopez, R. Castro Rojo, A. Wallander, N. Utzel, A. Neto, D. Alves, D. Valcarcel.
Paper title	Engineering Design of ITER Prototype Fast Plant System Controller
Journal name	Nuclear Science, IEEE Transactions on
Volume, page	58, Issue 4, Part:1, 1439 - 1446
Year	2011

Author(s)	A.P. Rodrigues, M. Correia, A. Batista, J. Sousa, B. Goncalves, C.M.B. Correia, C.A.F.Varandas.
Paper title	Intelligent Platform Management Controller for Nuclear Fusion Fast Plant System Controllers
Journal name	Nuclear Science, IEEE Transactions on
Volume, page	58, Issue 4, Part:1, 1733 - 1737

Year	2011

Author(s)	A. M. Fernandes, R. C. Pereira, J. Sousa, A. J. N. Batista, A. Combo, B. B. Carvalho, C. M. B. A. Correia, C. A. F. Varandas
Paper title	HDL based FPGA interface library for data acquisition and multipurpose real time algorithm processing
Journal name	IEEE Transactions on Nuclear Science
Volume, page	vol. 58(4), pp. 1526-1530
Year	Aug. 2011

B. Publications and contributions in conferences and workshops

Conference

Posters

Conference	IAEA 8th Technical Meeting on Control, Data Acquisition and Remote Participation for Fusion Research
Start-end date	20-24 June 2011
Location	San Francisco, USA
Author(s)	A. J. N. Batista, C. Leong, V. Bexiga, A. P. Rodrigues, A. Combo, B. B. Carvalho, J. Fortunato, M. Correia, J. P. Teixeira, I. C. Teixeira, J. Sousa, B. Gonçalves, C. A. F. Varandas
Poster title	ATCA PICMG3.4 / AXIe compatible blade for Fast Control and Data Acquisition in Nuclear Fusion Experiments