Name	Degree	% participation
André Cabrita Neto	PhD	100%

Part I – Scientific Activities

Summary and highlights of research achievements

Participation in the ITER project

New features were developed and integrated in the core MARTe real-time framework in order to allow the design, implementation and testing of the first software prototypes for the connection between the ITER CODAC EPICS tools and MARTe. New real-time modules for the MARTe framework were also developed in order to provide the real-time software core support for the assessment of several real-time networks configurations, based in Gigabit ethernet and PCIe.

Participation in the collective use of the JET facilities by the EFDA Associates

Participation in the JET Session Leader course and selection to be trained as a JET session leader.

In the context of the ITER like Wall project, the JET shape controller system was updated and integrated in the new real-time protection system stop scenarios. This new stopping mechanism was fully implemented and commissioned during the first restart of JET, after the long shutdown, and is being routinely used in the JET experimental campaigns.

The shape controller system was also changed to allow the usage of the PFX circuit in the early phases of the plasma discharge, enlarging the JET operational space but also greatly increasing the effects of external faults in the machine integrity. All the possible amplifier current combinations, simulation of possible faults, and the performance of the controller itself were asserted using a simulator of the controller, connected to linearised plasma models provided by the CREATE tools. The system was commissioned during the second restart of JET and is being successfully used to enable an earlier exploitation of the X-point configuration, optimising experimental resources and time.

Also in the context of the shape controller updates, a new module named Current Limit Avoidance was also developed. This new control module was commissioned during the third restart of JET and is ready to be scientifically exploited, where it can provide a a safer operation of the machine, while using the eXtreme Shape Controller, even in the presence of disturbances and when working near the power supply limits.

Part II – Scientific Output

A. Publications

Papers in international refereed scientific journals

Author(s)	A. Neto, D. Alves, L. Boncagni, P. J. Carvalho, D. F. Valcárcel, A. Barbalace, G. De Tommasi, H. Fernandes, F. Sartori, R. Vitelli, L. Zabeo and JET-EFDA Contributors
Paper title	A Survey of Recent MARTe Based Systems
Journal name	IEEE Transactions on Nuclear Science
Volume, page	58, 1482 - 1489
Year	2011

Author(s)	R. Albanese, G. Ambrosino, M. Ariola, G. Artaserse, T. Bellizio, V. Coccorese, F. Crisanti, G. De Tommasi, R. Fresa, P.J. Lomas, M. Mattei, F. Maviglia, A. Neto, F. Piccolo, A. Pironti, A. Portone, F.G. Rimini, F. Sartori, A. Sorrentino, V. Toigo, F. Villone, B. Viola and L. Zabeo
Paper title	Overview of modelling activities for Plasma Control Upgrade in JET
Journal name	Fusion Engineering and Design
Volume, page	86, 1030-1033
Year	2011

Author(s)	A. Barbalace, G. Manduchi, G. De Tommasi, A. Neto, F. Sartori, D. F. Valcárcel
Paper title	Performance comparison of EPICS IOC and MARTe in a Hard Real-Time Control Application

Journal name	IEEE Transactions on Nuclear Science
Volume, page	58, 3162 - 3166
Year	2011

Author(s)	T. Bellizio, G. De Tommasi, N. Risoli, R. Albanese and A. Neto
Paper title	A MARTe based simulator for the JET Vertical Stabilization system
Journal name	Fusion Engineering and Design
Volume, page	86, 1026-1029
Year	2011

Author(s)	F. G. Rimini, F. Crisanti, R. Albanese, G. Ambrosino, M. Ariola, G. Artaserse, T. Bellizio, V. Coccorese, G. De Tommasi, P. De Vries, P. J. Lomas, F. Maviglia, A. Neto, I. Nunes, A. Pironti, G. Ramogida, F. Sartori, S. R. Shaw, M. Tsalas, R. Vitelli and L. Zabeo
Paper title	First plasma operation of the enhanced JET vertical stabilisation system
Journal name	Fusion Engineering and Design
Volume, page	86, 539-543
Year	2011

Author(s)	T. Bellizio, R. Albanese, G. Ambrosino, M. Ariola, G. Artaserse, F. Crisanti, V. Coccorese, G. De Tommasi, P. J. Lomas, F. Maviglia, A. Neto, A. Pironti, F. Rimini, F. Sartori, R. Vitelli, L. Zabeo
Paper title	Control of Elongated Plasma in Presence of ELMs in the JET Tokamak
Journal name	IEEE Transactions on Nuclear Science
Volume, page	58, 1497 - 1502
Year	2011

Author(s)	G. De Tommasi, D. Alves, T. Bellizio, R. Felton, A. Neto, F. Sartori, R. Vitelli, L. Zabeo, R. Albanese, G. Ambrosino, P. J. Lomas
Paper title	Real-Time Systems in Tokamak Devices. A Case Study: The JET Tokamak
Journal name	IEEE Transactions on Nuclear Science
Volume, page	58, 1420 - 1426
Year	2011

Author(s)	L. Boncagni, Y. Sadeghi, D. Carnevale, G. Mazzitelli, A. Neto, D. Pucci, F. Sartori, F. Piesco, S. Sinibaldi, V. Vitale, R. Vitelli, L. Zaccarian, S. Monaco, G. Zamborlini
Paper title	First Steps in the FTU Migration Towards a Modular and Distributed Real-Time Control Architecture Based on MARTe
Journal name	IEEE Transactions on Nuclear Science

Volume, page	58, 1778 - 1783
Year	2011

B. Publications and contributions in conferences and workshops

Papers in conference proceedings

Author(s)	A. Neto, R. Albanese, G. Ambrosino, M. Ariola, G. Artaserse, B. B. Carvalho, F. Crisanti,G. De Tommasi, H. Fernandes, P. Lomas, F. Maviglia, A. Pironti, F. Rimini, F. Sartori
Paper title	Exploitation of Modularity in the JET Tokamak Vertical Stabilization System
Conference	50th IEEE Conference on Decision and Control and European Control Conference (CDC-ECC'11)
Volume, page	2644-2649
Year	2011

Author(s)	A. Neto, D. Alves, B.B. Carvalho, P.J. Carvalho, H. Fernandes, D.F. Valcárcel, F. Sartori, A. Barbalace, G. Manduchi, L. Boncagni, G. De Tommasi, P. McCullen, A. Stephen, R. Vitelli, L. Zabeo
Paper title	MARTe Framework: a Middleware for Real-time Applications Development
Conference	13th International Conference on Accelerator and Large Experimental Physics Control Systems (ICALEPCS'11)
Volume, page	THDAULT06
Year	2011

Author(s)	A. Neto, D. Alves, I. S. Carvalho, P. J. Lomas, R. Felton, P. McCullen, V. Riccardo, F. G. Rimini, A. Stephen, K-D. Zastrow, F. Maviglia, G. De Tommasi, R. Vitelli
Paper title	Shape Controller Upgrades for the JET ITER-like Wall
Conference	13th International Conference on Accelerator and Large Experimental Physics Control Systems (ICALEPCS'11)
Volume, page	MOPMU035
Year	2011

Author(s)	A.V. Stephen, G. Arnoux, T. Budd, P. Card, R.C. Felton, A. Goodyear, J. Harling, D. Kinna, P.J. Lomas, P. McCullen, P.D. Thomas, I.D. Young, K-D. Zastrow, D. Alves, A. Neto, S. Devaux, S. Jachmich
Paper title	Centralised Coordinated Control to Protect the JET ITER-like Wall
Conference	13th International Conference on Accelerator and Large Experimental Physics Control Systems (ICALEPCS'11)
Volume, page	FRAAULT04
Year	2011

Oral contributions

Conference	13th International Conference on Accelerator and Large Experimental Physics Control Systems (ICALEPCS'11)

Start-end date	October 10-15, 2011
Location	Grenoble, France
Author(s)	A. Neto, D. Alves, B.B. Carvalho, P.J. Carvalho, H. Fernandes, D.F. Valcárcel, F. Sartori, A. Barbalace, G. Manduchi, L. Boncagni, G. De Tommasi, P. McCullen, A. Stephen, R. Vitelli, L. Zabeo
Talk title	MARTe Framework: a Middleware for Real-time Applications Development

Posters

Conference	13th International Conference on Accelerator and Large Experimental Physics Control Systems (ICALEPCS'11)
Start-end date	October 10-15, 2011
Location	Grenoble, France
Author(s)	A. Neto, D. Alves, I. S. Carvalho, P. J. Lomas, R. Felton, P. McCullen, V. Riccardo, F. G. Rimini, A. Stephen, K-D. Zastrow, F. Maviglia, G. De Tommasi, R. Vitelli
Talk title	Shape Controller Upgrades for the JET ITER-like Wall

C. Other publications and outputs

Technical reports

A. Neto, F. Maviglia, "PPCC - POET Implementation System Design", Culham Design Note/H(11)032, Issue 1: 19th May 2011

G. De Tommasi, S. Galeani, A. Neto, A. Pironti, R. Vitelli, L. Zaccarian, "Current Limit Avoidance System Design", Culham Design Note/H(11)022, Issue 1: 7th April 2011

Other outpus

Presentation of the MARTe framework and demonstration of a live MARTe application in an ITER organised Fast Controller Workshop, which took place in Cadarache from the 28th of February to the 2nd of March 2011.

D. Education and training

Doctorate theses completed

André Cabrita Neto, "The JET Vertical Stabilisation Controller Framework", Universidade Técnica de Lisboa - Instituto Superior Técnico, Università degli Studi di Padova - Joint European Research Doctorate in Fusion Science and Engineering, April 2011, supervised by Horácio João Matos Fernandes