chist-era

CHIST–ERA Proposal Template

Project Acronym

ACE

Project Full Title

Autonomic Software Engineering for online cultural experiences

Addressed Call Topic (QIFT[1] or BASCC[2]): BASCC

Coordinator contact point for the proposal

Name	Carles Sierra
Institution/Department	IIIA-CSIC
Address	Campus UAB, Bellaterra
Country	Spain
Phone	(0034) 935809570
Fax	(0034) 935809661
Email	sierra@iiia.csic.es

Partners' people involved in the realisation of the project[3]

Partner Number	***Country***	***Institution/ Department***	***Name of the group leader***	***Name of other personnel participating in the project***
1 Coordinator	Spain	IIIA-CSIC	Carles Sierra	
2	United Kingdom	Goldsmiths, University of London	Mark d'Inverno	
3	France	Institute de Recherche en Informatique de Toulouse (IRIT)	Leila Amgoud	

(Use as much lines as needed)

1 *Quantum Information Foundations and Technologies*
2 *Beyond Autonomic Systems – the Challenge of Consciousness*
3 *If the people are for the moment unknown, specify the level of expertise sought (PhD, post-doc, engineer, professor…)*

chist-era

Duration: 24 months

Summary of the project[4] *(publishable abstract, max. ½ page):*

This project is about exploiting the predominance of social networking using autonomic software agents to enrich, encourage and enliven engagement with online cultural artefacts such as from a museum or a gallery. With the current problems in the European financial debt, many cultural institutions are planning to shorten the length that visitors can physically enter. In the UK for example we have heard of plans that the British Museum will close earlier and possibly shut down completely for one day a week because of the massive cuts in funding that were presented in the UK Chancellors speech detailing reduction in money for the cultural sector. The basic idea is to have your friends, museums, art galleries and theatres all in your pocket through your handheld device.

In this project we will harness the power of autonomic agents that work on behalf of human users in an infrastructure that allows for these agents to communicate and negotiate on behalf of their human users to facilitate a collective and social experience of online cultural visits. For example, we could imagine a scenario where 4 students are visiting an art museum with the desire to purchase something (a print or a physical copy of an artefact for example) for a friend. They would wish to be able negotiate about what to see or experience online, what additional information they want to consider, what comments from what previous visitors over any commentary they individually or collectively want to leave for others and, eventually, over what they collectively choose to purchase for their friend.

We are concerned with the fundamental question of building autonomic agents that can represent their users needs, argue and negotiate on behalf of their users with other software and human agents, maintain models of the other autonomic agents in the system and proactively develop plans and scenarios for their human counterparts. In order for autonomic agents to interact in open systems such as those we are describing we will use the BDI agent architecture (arguably the most important symbolic agent architecture of the last 20 years) on a well-developed infrastructure (called electronic institutions) that facilitates autonomic agent interaction.

In short we believe BDI architectures represent the stronger and best-developed software engineering device for building autonomic agents, that electronic institutions is the best developed infrastructure for supporting the interaction of autonomous interaction, and that the idea of enabling richer social exploration of cultural artefacts online is a timely and critical case study to address.

Relevance to the topic addressed in the call[5] *(max. ¼ page):*

Over the last 25 years one of the most important architectures for autonomic software agent systems has been the Belief-Desire-Intention (BDI) architecture where agents have many of the properties of the call in that (a) they maintain a symbolic representation of their current beliefs, goals, plans and intentions, (b) are aware of their dynamically changing environment within it (c) model others (d) dynamically respond to changes in their environments (e) make predictions about the intended outcome of actions (f) argue and negotiate with other agents and can modify their models of each other and the humans users they represent. However, whilst there has been a huge amount of work in developing infrastructures for agents to interact and coordinate their activities nearly all the work that has been presented (workflows, business models, petri nets etc) actually inhibit the autonomy and reflective decision making of agents. The most important counterexample is the work of electronic institutions that

[4] *Be precise and concise. This summary will be used to select suited reviewers for the proposal.*

[5] *Be precise and concise. Relevance to the topic addressed in the call is an essential eligibility criterion.*

chist-era

CHIST–ERA Proposal Template

Project Acronym

PNEUMA

Project Full Title

Plasticity in NEUral Memristive Architectures

Addressed Call Topic (QIFT or BASCC): BASCC

Coordinator contact point for the proposal

Name	Dr Themis Prodromakis
Institution/Department	Imperial College London, Centre for Bio-inspired Technology
Address	South Kensington campus, Bessemer building, London, SW7 2AZ
Country	UK
Phone	+44 20759 40840
Fax	+44 20759 40704
Email	t.prodromakis@imperial.ac.uk

Partners' people involved in the realisation of the project

Partner Number	***Country***	***Institution/ Department***	***Name of the group leader***	***Name of other personnel participating in the project***
1 Co-ordinator	UK	Imperial College London (**ICL**), Department of Electrical and Electronic Eng, Centre for Bio-inspired Technology (**CBiT**)	Prof. Chris Toumazou	Dr. Themis Prodromakis, 1 Technician
2	Spain	Consejo Superior de Investigaciones Científicas (**CSIC**), Instituto de Microelectrónica de Sevilla (**IMSE*)***	Prof. Bernabe Linares-Barranco	Dr. Teresa Serrano-Gotarredona 1 PostDoc
3	Switzerland	University of Zurich **(UZH)**, Institute of Neuroinformatics (**INI**)	Dr. Giacomo Indiveri	1 PostDoc
4	Austria	Graz University of Technology (**TU Graz**),Institute for Theoretical Computer Science (**IGI**)	Dr. Robert Legenstein	2 PhDs
5	France	Centre national de la recherche scientifique (CNRS), Laboratoire d'Analyse et d'Architecture des Systèmes (**LAAS**)	Prof. Robert Plana	Dr.Patrick Pons 1 Post-doc

(Use as much lines as needed)

chist-era

Duration: 36 months

Summary of the project *(publishable abstract, max. ½ page):*

During the past two decades, philosophers, psychologists, cognitive scientists, clinicians and neuroscientists strived to provide authoritative definitions of consciousness within a neurobiological framework. Engineers have more recently joined this quest by developing neuromorphic VLSI circuits for emulating biological functions. Yet, to date artificial systems have not been able to faithfully recreate natural attributes such as true processing locality (memory and computation) and complexity (10^{10} synapses per cm^2), preventing the achievement of a long-term goal: the creation of autonomous cognitive systems.

This project aspires to develop experimental platforms capable of perceiving, learning and adapting to stimuli by leveraging on the latest developments of five leading European institutions in neuroscience, nanotechnology, modeling and circuit design. The non-linear dynamics as well as the plasticity of the newly discovered *memristor* are shown to support Spike-based- and Spike-Timing-Dependent-Plasticity (**STDP**), making this extremely compact device an excellent candidate for realizing large-scale self-adaptive circuits; a step towards "**autonomous cognitive systems**". The intrinsic properties of real neurons and synapses as well as their organization in forming neural circuits will be exploited for optimizing CMOS-based neurons, memristive grids and the integration of the two into real-time biophysically realistic neuromorphic systems. Finally, the platforms would be tested with conventional as well as abstract methods to evaluate the technology and its autonomous capacity.

Relevance to the topic addressed in the call *(max. ¼ page):*

For the past 20 years, many research institutions have followed the neuromorphic paradigm, trying to develop systems capable of cognitive processing. Although, great progress has been made by the utilization of analogue computation, the lack of appropriate technological means restricted the implementation of these ideas. With the invention of the memristor, the proposed area of research is re-established and we now have the opportunity to develop practical synaptic-type systems based on memristors that will advance the state-of-the-art significantly. The challenge of cognition requires the labours of many scientists, of many kinds. The interdisciplinary framework we propose, bridges distinct areas of expertise in a non-conventional way to adventure what we believe is a risky but high payoff technology. Nevertheless, in spite of the inherent risks, a number of research objectives are also identified within the separate research axons and whose maturation is essential for establishing the relevant critical mass and scientific excellence to confront emerging applications in Autonomic Systems and beyond.

Detailed project information

General recommendation:

1. *The same font and style should be used for the whole proposal (Arial, 11pt, single spaced).*
2. *All of the following sections have to be filled in for the proposal.*
3. ***Please adhere to the given page limits.***
4. *Refer to the call announcement for the evaluation criteria; make sure that all aspects listed there are covered by your proposal.*