Awareness newsletter

News from the Awareness Co-ordination Action project

Awareness Projects:

ASCENS
Autonomic Service-Component Ensembles

EPICS
Engineering Proprioception in Computing Systems

RECOGNITION
Relevance and cognition for self-awareness in a content-centric Internet

SAPERE
Self-aware Pervasive Service Ecosystems

and also supporting:

CoCoRo
Collective Cognitive Robots

SYMBRION
Symbiotic Evolutionary Robot Organisms
Editorial

Many of you will be reading this following what has undoubtedly been a hectic period preparing for your first year review; hopefully with successful reviews now behind, everyone we can look forward to a busy and fruitful second year of the Awareness proactive initiative.

This newsletter reviews some of the highlights of the first year, as well as giving you a preview of some events planned for the coming year. Please take a moment to read about some of the activities we have planned for next year, and let us know if you would like to contribute in any way, big or small! It only takes a few minutes to fire off a 140 character tweet to #awareness101 to add your challenge for the field to the growing list. If you have a bit more time, why not write a two-page article for the Awareness magazine, and you can find out more about inside this issue.

One of our main aims for 2012/13 is to raise awareness (sorry!) of the Awareness initiative beyond the funded projects. We’ll be hosting a range of events; the first one planned is a public talk by Prof. Alan Winfield entitled ‘the Thinking Robot’, in April at the Edinburgh International Science Festival, one of Europe’s largest science festivals. We are very excited to host this public talk within the newly refurbished National Museum of Scotland. We’re also planning a series of workshops and events, a calendar of which should appear on our website soon.

The Thinking Robot

Professor Alan Winfield
University of the West of England, Bristol, UK

Press headlines frequently refer to robots that think like humans, have feelings, or even behave ethically, but is there any basis of truth in such headlines, or are they simply sensationalist hype? Computer scientist EW Dijkstra famously wrote “the question of whether machines can think is about as relevant as the question of whether submarine can swim”, but the question of robot thought is one that cannot so easily be dismissed. In this talk I will describe the current state-of-the-art in robot intelligence. I will attempt to answer the question “how intelligent are present day intelligent robots?” and describe efforts to design robots that are not only more intelligent but also have a sense of self. But if we should be successful in designing such robots, would they think like animals, or even humans? And are there risks, or ethical issues, in attempting to design robots that think?

The Awareness project is delighted to be presenting a talk by Professor Alan Winfield at the Edinburgh International Science Festival in 2012. The Festival is one of Europe’s largest celebrations of science and technology, and this event will be an opportunity to raise the profile of awareness research amongst the public. The full programme will be available in February 2012.

Keep up to date with Awareness activities:
Website: www.aware-project.eu
Facebook page: Awareness: Self awareness in autonomic systems
Twitter @euawareness
Linkedin group: Awareness CA

The last Awareness event of 2011 takes place in December, with a PhD Forum at Bionetics 2011, where young researchers can present their work in a supportive environment. After this, we’ll be taking a break for a few weeks over the holiday period; we wish everyone a Happy New Year and look forward to meeting as many people as possible at the Awareness inter-project day in January.
Now into the second year of Awareness, we reflect on some activities undertaken by the coordination action in the first year.

Keeping you up-to-date - We’ve:

Set up the project website (www.aware-project.eu), a constant presence and focal point for the community, providing information across a range of topics for a variety of users using a variety of media.

Published two newletters and sent regular mailings to provide regular updates of research news – do let us know if you want anything including in future mailings.

Developed our membership base to around 750 people.

Provided funding to enable a number of research exchanges between researchers from different countries.

Looking Ahead

A series of workshops, public talks and other outreach events are planned to provide information dissemination and knowledge transfer opportunities - find out more on our website: www.aware-project.eu

Look out for the summer school which will take place in June 2011.

AWARENESS events:

A varied programme of events were either planned or took place during year one:

- The first workshop at SASO 2011 - keep up with plans for events in 2012/13 on our website.
- Planning the first Inter-Project day which will take place in Bologna in January 2012, hosted by SAPERE. All project members are welcome to take part to learn from each other and share results – the website currently give details of the agenda for this meeting
- Holding a PhD forum at Bionetics 2011, for young researchers to present their work, with an invited talk called ‘Getting a PhD in bio-inspired computing’ by Prof. A.E. Eiben
- Running a virtual lecture series to highlight relevant new work and to serve as a useful resource for research and teaching, with plans to extend in future - look out for the remaining lectures!

Outreach

To raise awareness of the research going in the field and future impact, we’ve planned a number of outreach activities to take place in 2012 and 2013:

- The online Awareness Magazine including features on self-awareness research success stories which goes live at the beginning of December 2011.
- The publication of an Awareness Book with selected chapters presenting research results and considering wider socio-technical, socio-political and/or environmental impact.
- A longer video documentary which will create a coherent thematic narrative of Awareness research to engage a wider audience.
- An Awareness iPad app to access the Awareness training materials in ways which are specific to mobile devices and considering the opening of an iTunes U portal to provide an additional interface for Awareness materials.
- Again, please contact us if you would like to contribute to any or all of the above.

First Steps to a Research Agenda for Self-Awareness

Planning and hosting a series of research consultations and roadmapping activities in a variety of different formats to encourage participation, including video blogs, twitter, online postings and conducting targeted interviews:

- See the video wall on the website.
- Join the AWARENESS 101 Campaign!
- Please contact us if you would like to feature on our video wall in the future!
The series of Awareness virtual lectures have been taking place on Friday afternoons over the past few weeks. Each online lecture was followed by a chance to discuss the topic with the presenter on a live chat forum. If you missed the lecture series, all the lectures are available to view as recordings on the Awareness website, along with slides and resources.

Aimed at students, and researchers from different disciplines, this virtual lecture series covered theoretical, practical, and technological issues related to autonomic self-awareness and its various facets. These include self-organising and self-adaptive systems, pervasive computing technologies as well as security and socio/economic aspects of autonomic computing.

Managing complexity in systems
Managing systems is increasingly becoming more challenging. Different devices, heterogeneous platforms and different programming models can now be connected into a single system, and devices are increasing in technological complexity. These factors not only make systems unmanageable but lead to systems exhibiting unplanned behaviours. To counter this, systems must become self-aware, exhibiting context-awareness at an internal and external level.

Adaptation and Awareness in Robot Ensembles
All the lectures dealt with subjects relevant to researchers working in the domain of self-awareness. As an example, Matthias Holz of the ASCENS project, talked about Adaptation and Awareness in Robot Ensembles. In this talk, Matthias describes the concepts of adaptation and awareness, and how they apply to distributed autonomous systems or ensembles. This informal discussion will be made precise by giving a system model for ensembles on which a mathematical theory of adaptation and awareness can be based. Using this theory we can precisely distinguish adaptation to environment, network and sensors/actuators, and goals; and we can discuss how adaptation, awareness and self-awareness are related. As a case study for the theory we will implement an ensemble of swarm robots whose task is to explore and exploit the resources in a number of environments. The exercises will be performed using the ARGoS simulator for robot swarms and will demonstrate various levels of environmental awareness and of adaptation to different environments and goals.

Matthias Hölzl is a senior researcher in the PST research group at LMU Munich and project manager of the ASCENS project.

It is intuitively obvious that adaptation and awareness play an important role in the development of autonomous systems, and in particular those sophisticated distributed autonomous systems which are often called ensembles. We will therefore start with a discussion of notions such as adaptation, awareness, cognition and consciousness.

The Awareness virtual Lecture Series:
www.aware-project.eu/lectures
More Awareness videos at
http://vimeo.com/euawareness
The first Awareness workshop was held at the IEEE SASO 2011 conference in Ann Arbor, Michigan, USA, during the first week of October. The workshop took place on the final day of the conference, and attracted around 30 delegates, causing a last minute room change to accommodate everyone!

We were delighted to open the workshop with an invited talk by Dr Niranjan Suri from the Florida Institute of Human Cognition and Behaviour. Dr Suri’s current research activity is focused on Agile Computing, which supports the opportunistic discovery and exploitation of resources in highly dynamic networked environments. He also works on Process Integrated Mechanisms, a novel approach to coordinating the behavior of multiple robotic, satellite, and human platforms. His broad-ranging talk covered any aspects of self-aware computing and was very well received.

The varied talks stimulated much discussion. In particular, the workshop was an excellent opportunity to welcome many North American delegates to the Awareness fold as well as providing an opportunity for several of the projects funded under the Awareness proactive initiative to present their work and meet each other.

We intend to submit a proposal to SASO 2012 (to be held in Lyon, France) for a follow-on workshop next year. Watch this space!

Awareness Researcher wins best paper at SASO 2011!

We are delighted to announce that Dr Jeremey Pitt, a member of the Awareness team, (with Julia Schaumeler and Alexander Artikis) were awarded the Best Paper prize at the 5th IEEE Conference on Self-Adaptive and Self-Organizing Systems (SASO 2011) for their paper entitled “The Axiomatisation of Socio-Economic Principles for Self-Organising Systems”.

Awareness researcher wins award at SASO 2011!
ASCENS project gets blogging

www.ascens-ist.eu/press

The ASCENS project, supported by the Awareness Coordination Action, includes a blog on their website, covering a range of topics relating to the project work. The goal of the ASCENS project is to build ensembles in a way that combines the maturity and wide applicability of traditional software engineering approaches with the assurance about functional and non-functional properties provided by formal methods and the flexibility, low management overhead, and optimal utilization of resources promised by autonomic, adaptive, self-aware systems.

ASCENS project

On 27th June, The Cercia centre at the University of Birmingham hosted a workshop on Self-Awareness in Computing, as part of the EPiCs project.

Workshop Scope
As the development of computing systems continues, they are increasingly being composed of large numbers of heterogeneous components, each with potentially different goals or local perspectives, and connected in networks whose topologies change over time. Management of such systems quickly becomes infeasible for humans. As such, future computing systems, from robots to personal music devices to web services, should be able to achieve advanced levels of autonomous behaviour, in order to manage and adapt themselves. Nevertheless, users still expect high performance, reliability, security and other qualities.

In order for a system to effectively manage itself and adapt to changing circumstances, the system’s ability to be self-aware becomes important. Self-awareness is concerned with the availability and collection of knowledge about a system by that system. The presence of such knowledge permits reasoning and intelligent decision making, which can support effective, autonomous adaptive behaviour.

In realising self-awareness in computing systems, contributions from many disciplines will be required; amongst them are psychology, philosophy, economics, complexity science, artificial and computational intelligence and electronic and software engineering. This workshop aims to bring together representatives of these fields and those working on building novel self-aware computing systems. It provides a forum for discussion of challenges in realising self-aware machines and likely fruitful directions for research.

Invited Speakers

Martijn Schut, VU University, Amsterdam
Self-Awareness in Autonomic Systems

Aaron Sloman, University of Birmingham
Varieties of Self-Awareness and their Uses in Natural and Artificial Systems

Milton Martinez Luaces, Politecnic University of Madrid
A Neural Network Model of Self-Representation for Autonomous Agents in Competitive Multi-agent Systems

Kyrre Glette, University of Oslo
Self-Awareness in Hypermusic

Licia Capra, UCL, London
Self-Adaptation of Online Recommender Systems via Feed-Forward Controllers

Serge Kernbach, University of Stuttgart
Achieving Self-Awareness in Collective Systems

The ASCENS consortium is both scientifically and pragmatically driven. The objective is to promote results in academia, e.g. through a set of associated researchers and also providing informative and pragmatic descriptions of the project results for practitioners and the industry in general, in form of white papers, press releases or blog entries.

Some ASCENS blog entries:

What are ensembles? And why should I care? by Matthias Hölz!

Robot swarms - What can formal methods do? by Francesco Tiezzi

Robot swarms - What can they do? by Rehan O’Grady

Ensembles and mobile robots - Where is the link? by Francesco Mondada

Dreaming of fluffy clouds by Stefan Reiter

Could application architectures by Zimory
The research agenda section of the Awareness project website is filling up with opinions, comments and ideas from researchers.

The research agenda provides opinion related to the Awareness Initiative from expert researchers and scientists who have interests in the field. Here you can find ideas about the main challenges, specific issues to be addressed, and potential impacts of research into self-awareness in autonomic systems.

Giacomo Cabri is organising the contributions to the Awareness Research Agenda. Watch the video of Giacomo explaining the Agenda on the Awareness website: www.aware-project.eu/research-agenda

The agenda consists of short video interviews from leading researchers, paper reviews, and opinions on the main challenges that are facing researchers in the domain of self-awareness. All of these contributions can be viewed on the Awareness website.

We welcome your contributions to the Awareness Research Agenda - please email Giacomo Cabri: giacomo.cabri@unimore.it

Awareness 101

101 Challenges for Self-Aware Autonomic Systems

The big grand challenges in science research can often be broken down into many smaller challenges. The Awareness project is trying to identify 101 key challenges that can contribute to the long-term advancement of research in the field of self-aware autonomic systems.

We need your help!

We are inviting researchers to tell us what they see as key issues, and identify critical areas for future research, in both the short and long term. Do you have a radically new vision for the area? Can you identify new challenges that will drive this important research discipline forward? Visit our website and post your challenge or tweet your challenge using the hashtag #awareness101

Awareness supports researchers that share an interest in creating autonomic systems which are self-aware, creating systems which benefit from lower management costs due to the ability to adapt to changing environments and patterns of use, and are more efficient in terms of resource usage.

We welcome researchers from a broad range of disciplines that can contribute to this research. You can follow our work by signing up to the mailing list on our website which will keep you to date with funding opportunities, calls for participation, Awareness news, etc, all from a single source.

www.aware-project.eu
A wiki is now available for the inter-project meeting. Please visit the page for travel/accommodation information, and to begin contributing to the pre-meeting discussion. Upload your slides, and add a post with and proposals or suggestions you have for measuring confidence or post a list of topics you would like to see discussed at the meeting.

http://awarenessinterproject.wikispaces.com

Rationale

Although each research project has its own goals and objectives, it is likely that similar challenges are faced. The workshop aims to identify areas of common interest, and common challenges, and look at ways in which expertise can be shared. If appropriate, Awareness can organise further ‘expert’ workshops on specific topics to enable projects to address their future needs.
The Awareness magazine has been launched and the first batch of articles are available for reading online or downloading. These short, two-page articles are written in an informal style and aimed at a general audience, showcasing research in self-aware autonomic systems. All articles have a DOI and can be viewed online or in pdf format. Articles are written in a lively style and cover recent advances and research news - ideal for iPad reading on your next flight!

If you would like to write an article for the magazine, please contact Dr Jeremy Pitt. j.pitt@imperial.ac.uk

www.awareness-mag.eu

Articles online so far include:

**Self-awareness in a content-centric Internet**
*Stuart Allen and Roger Whitaker*

“Intelligent web sites are offering personalized content that is tailormade to the needs of the user. In recent years, user-generated content and participatory web-based services have become more popular on the Internet. Examples include ‘traditional’ formats, such as photographs (Flickr) and blogs (livejournal.com, blogger.com), social networks (Facebook, LinkedIn), and micro-blogging (Tumblr, Twitter). More recently, location-based services (foursquare.com) and ad-hoc sharing (color.com) have begun to gain popularity.”

**A self-aware swarm of underwater vehicles**
*Thomas Schmickl, Christoph Möslinger, and Ronald Thenius*

“Europe’s Collective Cognitive Robots project aims to create a group of interacting, autonomous robots that could perform ecological monitoring and other tasks in underwater habitats. The vast oceans that cover most of Earth’s surface are still mainly unexplored. Their gigantic volume is impossible to monitor area-wide. When something is lost, such as a crashed airplane’s black box or sunken cargo, or when toxic waste is illegally dumped into the ocean, either manned submarines or unmanned remotely operated vehicles (ROVs) are used for recovery.”

**Towards nature-inspired ecosystems for pervasive services**
*Franco Zambonelli*

“Europe’s Self-Aware Pervasive Service Ecosystems project promotes systemic self-awareness at the ecosystem level. The advent of ubiquitous wireless connectivity has substantially changed the information and communication technologies (ICT) landscape. It is being further reshaped by the deployment of pervasive computing technologies.”

**Increasing the popularity of cloud computing by improving its market performance**
*Ivan Breskovic and Ivona Brandic*

“Autonomically adjustable cloud markets enable fast, simple and inexpensive ways to sell and purchase electronic services. Cloud computing is a novel paradigm that offers access to resources (e.g., software services, platforms and hardware infrastructures) on demand without regard to where the services are hosted or how they are delivered, much like traditional utilities such as water, electricity, gas and telephony.”

**Self-adjusting autonomous systems**
*Michael T. Cox and Don Perlis*

“A solution to the problem of brittle software systems is to endow them with a metacognitive layer that enables the system to reason about failure. The long-standing promise of artificial intelligence (AI) is a bright new world in which smart machines positively transform the ways we live and work. However, a well-known difficulty for AI is the problem of brittleness.”
10th Adaptive Computing (and Agents) for Enhanced Collaboration (ACEC)

http://acec.portals.mbs.ac.uk
Conference Track @ IEEE WETICE 2012
Deadline: March 5th 2012
Date: June 25 - 27, 2012, Location: Toulouse, France
Over its 9 years in existence, ACEC has focused on projects that leverage the adaptability, autonomy and intelligence of first-class software agents for the collaboration that occurs across enterprise software systems. The organizers would like to continue to explore research in agent-based computing, but also we will welcome a wider array of projects that leverage adaptive techniques that may not include all the attributes of first-class software agents. In addition to our traditional domain areas, i.e. Computer Supported Collaborative Work, Workflow and Supply Chain Management, Automation in Virtual Enterprises, and Automated Distributed Service Composition, we are also interested in new adaptive techniques such as collaboration when organizations leverage emerging web techniques such as Cloud Computing, Crowd-Sourcing and general Social Networking.

In addition to traditional papers, the forthcoming 10th episode of ACEC welcomes papers from two focus areas:
Adaptive and Agent-based Services
Adaptive Techniques for Organizational/Enterprise Use of Emerging Web Paradigms (Cloud, Crowd-sourcing, Mobile Apps)

SEAMS 2012: 7th International Symposium on Software Engineering for Adaptive and Self-Managing Systems

www.seams2012.cs.uvic.ca
Deadline: January 10, 2012
Zürich, Switzerland, June 4-5, 2012
An increasingly important requirement for a software-intensive system is the ability to self-manage by adapting itself at run time to handle changing user needs, system intrusions or faults, a changing operational environment, and resource variability. Such a system must configure and reconfigure itself, augment its functionality, continually optimize itself, protect itself, and recover itself, while keeping its complexity hidden from the user.
The topic of self-adaptive and self-managing systems has been studied in a large number of specific areas, including software architectures, fault-tolerant computing, robotics, control systems, programming languages, and biologically-inspired computing.
The objective of this symposium is to bring together researchers and practitioners from many of these diverse areas to engage in stimulating dialogue regarding the fundamental principles, state of the art, and critical challenges of self-adaptive and self-managing systems. Specifically, we intend to focus on the software engineering aspects, including the methods, architectures, algorithms, techniques, and tools that can be used to support dynamic adaptive behavior that includes self-adaptive, self-managing, self-healing, self-optimizing, and self-configuring, and autonomic software.

ICAC The 9th International Conference on Autonomic Computing

San Jose, California, USA  September, 2012
www.autonomic-conference.org
Scope: ICAC is the leading conference on autonomic computing applications, technology and foundations. Autonomic computing refers to methods and means for automated management of performance, fault, security and configuration with little involvement of users or administrators. Systems introducing new autonomic features are becoming increasingly prevalent, motivating research that spans a variety of areas, from computer systems, architecture, databases and networks to machine learning, control theory, and bio-inspired computing.

CHI 2012 workshop: End-user interactions with intelligent and autonomous systems

www.city.ac.uk/informatics/school-organisation/centre-for-human-computer-interaction-design/enduserias
Position papers due: 13 January 2012:
Systems that learn from or personalize themselves to users are quickly becoming mainstream yet interaction with these systems presents many challenges for the end user. This workshop focuses on how to make these systems transparent, controllable, and ultimately trustworthy to end users. The aims of the workshop are to help establish connections among academic and industrial researchers bringing real-world problems to the table and to facilitate the exchange of approaches and solutions that could better support end users.

Events for Awareness Researchers

There’s still time to submit your research work to the following conferences taking place in 2012. If you know of any relevant conferences that Awareness researchers should be adding to their calendars, drop an email to Ingi at the Awareness Project: i.helgason@napier.ac.uk.
The **Awareness Coordination Action** project provides a collaborative environment for research into self-awareness in autonomic systems, supporting the network of researchers and engaging with a wider scientific and technological audience.

Awareness reaches out to a diverse, multidisciplinary scientific community that researches self-aware autonomic systems. As technology continues to rapidly advance, the management of systems becomes more difficult, and they must increasingly be able to manage themselves implying that they must be self-aware. Achieving truly self-aware systems is of interest to almost everyone in society as it will have technical, social and economic impacts. The FET funded projects that we support are:

**ASCENS:**
Autonomic Service-Component Ensembles

**CoCoRo:**
Collective Cognitive Robots

**EPICS:**
Engineering Proprioception in Computing Systems

**RECOGNITION:**
Relevance and cognition for self-awareness in a content-centric Internet

**SAPERE:**
Self-aware Pervasive Service Ecosystems

**SYMBRION:**
Symbiotic Evolutionary Robot Organisms (funded by PerAda)

**What the Awareness project does:**
Organises summer schools and virtual lectures to train the researchers of the future and for interdisciplinary knowledge exchange. Arranges workshops relevant to the self-awareness community of researchers. Presents public showcase events. Creates widely accessible publications, and training materials for use in teaching and outreach work. Provides funding for research exchanges. Disseminates the research output of our supported FET funded projects. Shapes the Research Agenda of the future: this will gather opinion relating to the Awareness Initiative from expert researchers and scientists.

www.aware-project.eu
Working in the field of Self-Aware Autonomic Systems?

- Are you a researcher looking to collaborate with another researcher from another institution?
- Do you want to kick-start a collaboration with someone from a different discipline?
- Have you some experience to share with companies or SMEs?
- Would you like to invite an expert from another institution to work with you, or explain their ideas to your own research group?
- Would your Awareness project benefit by sharing ideas with other FET-funded projects?

Awareness is the European Commission’s FET Proactive Initiative on Self-Awareness in Autonomic Systems. The coordination action funds research exchanges to encourage interaction between institutions, organisations, industry and SMEs. We can “match-fund” travel and accommodation costs for researchers engaged in research related to self-awareness in autonomic systems, especially if they aim to learn from different disciplines or transfer knowledge between academia and industry. This means we can pay up to 50% of the costs as long as the host organisation or the individual visiting researcher pays the balance of costs.

Full details including an FAQ and application form are available on the Awareness website.

www.aware-project.eu

Deadlines: 30th September/December/March/June 2011-2013

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