

**Message from the CIS President**

I am very glad and honored to address you in these opening remarks for the Autonomous Mental Development Newsletter. We started together on a long ride in the scientific, technological and application areas of autonomous mental development. This complex, but exciting, topic is a challenging aspect of computational intelligence which will allow us to have a better understanding of brain functions and their development by means of research in psychology, neuroscience, machine intelligence, and related fields. Even though this area was established in the IEEE Computational Intelligence Society only

recently, we are proud and happy since we have already achieved many goals: the Technical Committee on AMD is now well known and focused on the advancement of this scientific and technological area, the AMD Newsletter is already known as the reference letter in this specific field, the Conference on AMD is growing, and -most important- even though many of you do not feel you are engineers, we all are working together for the advancement of knowledge in understanding human reasoning and its possible applications. Let's continue our productive collaboration together under the same umbrella of the IEEE CIS, which strives to be our common home!

-Vincenzo Piuri, President, IEEE Computational Intelligence Society (2006-07)

**Message from the Past Chair of the AMD Committee**

It was my great pleasure to welcome Prof. Brian Scassellati, Yale University, as the new chairman of the AMD TC. Brian and I have been working together from the first ICDL, i.e., Workshop on Development and Learning in 2000. I trust that our TC will further grow under this new leadership. I would also like to thank all those who contributed to the establishment of the AMD TC at the beginning of 2004 and its growth since then. I am also happy that Dr. Shuqing Zeng, GM Research and Development, was willing to serve this community as the new editor of the AMD Newsletter. Yilu Zhang, the founding editor of

the AMD Newsletter since 2004 has done a great job. I would also like to thank the editorial assistants Nicholas Wassil, Kimberly Thompson, and Stephanie Beal who worked with me in assisting the editor. I trust that our AMD Newsletter will continue to grow and improve.

-Juyang (John) Weng, Past Chair of the AMD TC (2004-2005)

**Message from the Chair of the AMD Committee**

Let me be the first to thank Juyang (John) Weng for his years of service to the AMD community. John played a pivotal role in the creation and organization of this community and has been the champion of our cause to IEEE and the world at large. My thanks also go out to our outgoing AMD newsletter editor, Yilu Zhang. Under his guidance, the AMD Newsletter has been a powerful tool for building our community identity.

Over the past few years, the AMD community has seen phenomenal growth in many respects. Our conferences are attracting papers in greater numbers and of greater quality. Perhaps most importantly, the number of papers and projects that involve individuals from multiple disciplines has grown sharply. In the coming year, my goals for this community are to (1) continue to strengthen the interdisciplinary nature of the community, both by encouraging a richer collaboration between disciplines and by reaching out to professional societies within psychology and neuroscience, and (2) to continue to establish an AMD presence in the IEEE community through a renewed attempt to establish an IEEE Transactions on AMD and by raising our visibility with other technical committees in similar disciplines.

-Brian Scassellati, Current Chair of the AMD TC (2006-2007)

## Message from the Editor



Welcome to the first issue of the AMD TC Newsletter in 2006. I would like to thank IEEE CIS for funding this newsletter. The newsletter will continue to serve as a media that researchers can exchange opinions and viewpoints on an important topic of common interest. Starting with this issue, the Dialog Column will be taking a slightly different format. To encourage more people to respond, and to allow them more time to respond, we will now publish a question or dialog topic in each issue and the responses to that topic in the following issue.

In the Dialog Column of this issue, Brian Scassellati poses an initial statement: "Is our toolbox full?" Researchers interested in the topic are welcome to submit a response (contact [scaz@cs.yale.edu](mailto:scaz@cs.yale.edu) or [shuqing.zeng@gm.com](mailto:shuqing.zeng@gm.com)) by **August 1, 2006**. The length of each response must be between 300 and 500 words (including references), due to the page limitation of the Newsletter.

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## Committee News

- In mid-December, 2005, the AMD TC chairman Juyang Weng appointed the new AMD Newsletter editor Shuqing Zeng, Ph.D. senior researcher, GM Research and Development. Dr. Yilu Zhang, the founding editor of the AMD Newsletter, became the past editor
- In mid-March, 2006, the new IEEE CIS President Vincenzo Piuri appointed Prof. Brian Scassellati, Yale University, as the new chairman of the AMD Technical Committee. Brain Scassellati accepted this appointment. Prof. Juyang Weng, the founding chairman of the AMD Technical Committee, became the past chairman
- The Special Issue on Autonomous Mental Development in the IEEE Transactions on Evolutionary Computation, co-edited by Prof. James McClelland, Center for the Neural Basis of Cognition, Carnegie Mellon University, Prof. Kim Plunkett, Department of Experimental Psychology, Oxford University, and Juyang (John) Weng, Embodied Intelligence Laboratory, Michigan State University, has received the second round of reviews.
- The Special Session on Autonomous Mental Development of IEEE World Congress on Computational Intelligence (WCCI), Vancouver, BC Canada, July 16-21, 2006, co-organized by Prof. Brian Scassellati and Prof. Juyang (John) Weng, has completed the reviews.
- Open registrations are open for the tutorial "Biologically Motivated Mental Architectures," 12:30pm - 3:00pm, Sunday, July 16, at WCCI 2006. Tutorial lecturer: Juyang (John) Weng. [http://www.wcci2006.org/WCCI-Web\\_tutorial.html](http://www.wcci2006.org/WCCI-Web_tutorial.html)

## Dialog Column

### Is our toolbox full?



Brian Scassellati, Department of Computer Science  
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As a young, interdisciplinary field, we draw our methodologies and the tools that we use primarily from our parent disciplines. We build complex artifacts with a combination of requirements analysis, divide-and-conquer techniques, and human factors engineering. We rely on the scientific method for developing falsifiable hypotheses, generating predictions from these hypotheses, and constructing appropriate experimental protocols to assess our hypotheses. We use analysis techniques based on dynamical systems theory, Bayesian analysis, and information theory. We employ concepts like scaffolding, situated learning, and distributed intelligence.

Are these tools sufficient? Do we as a community have the appropriate methods and techniques to understand, model, and create systems that exhibit autonomous mental development? If we are lacking something, is the missing piece somehow an amalgamation of these existing techniques, a hybrid methodology that pulls together the strengths of these varied approaches? Or are we missing something that is truly fundamental, a new approach that will change the way that we think about these problems? Are we looking for an extension to existing methods or a revolutionary new methodology?

We invite your comments and critiques. Submissions can be sent to [scaz@cs.yale.edu](mailto:scaz@cs.yale.edu) or [shuqing.zeng@gm.com](mailto:shuqing.zeng@gm.com) by **August 1, 2006**. Selected responses will appear in the next edition of the newsletter.

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## Call for Paper



### International Journal of Humanoid Robotics *Special Issue on Autonomous Mental Development*

The term "humanoid" implies not only an anthropomorphic body shape, but also human like mental capabilities. It is a well known fact that all human adult-level mental skills are impossible without a process of development, from conception to infancy and to adulthood. It is also a well known fact that human mental capabilities are multiple, including those represented by perceptual, cognitive, behavioral and emotional categories, all of them are fundamental to humanoid robotics.

Although developmental psychology and neural science are extremely useful for the computational study of intelligent robotics, research in developmental robotics is expected to improve our understanding of the working of the whole range of mental capabilities in humans and to enable autonomous development of these highly complex and highly integrated capabilities by robots and other artificial systems.

An autonomous, real-time, incremental, open-ended, sensor-grounded and effector-grounded operational mode of mental development implies that multiple disciplines of human intelligence and artificial intelligence face many similar research issues. This special issue focuses on computational modeling of perceptual, cognitive, behavioral

## Call for Paper (continue)

and motivational development, enabled by the genes, but is multidisciplinary in nature, inviting researchers from all related fields including, but not limited to, animal learning, computational intelligence, computer vision, machine learning, neuroscience, philosophy, psychology, robotics, and speech recognition. Although understanding or realizing fully autonomous modes of mental development is a goal, intermediate results toward this goal are all encouraged.

We encourage authors from different geographic locations and different fields.

The subjects of the special issue include, but are not limited to:

- (1) Architecture of mental development
- (2) Generation of representation during development
- (3) Learning and training techniques for development
- (4) Automated feature extraction, PCA, LDA, ICA, etc.
- (5) Development of early processors (e.g., clustering)
- (6) Attention mechanisms and development
- (7) Development of later processors (e.g., regression)
- (8) Vision system and its development
- (9) Auditory system and its development
- (10) Touch and motor systems and their development
- (11) Language acquisition through development
- (12) Multimodal integration through development
- (13) Conceptual development
- (14) Neural plasticity during development
- (15) Motivational system and its development
- (16) Emotions and their roles in the motivational system
- (17) Autonomous thinking and its development
- (18) Developmental robots and systems
- (19) Comparison of approaches to machine intelligence
- (20) Social and philosophical issues of development

Papers submitted must not have been published and are not being considered for publication in any journal. Substantial revisions of conference papers are eligible and the authors should inform the Guest Editors at the time of submission. All papers will be reviewed in accordance with IJHR policy.

The guest editors of this special issue:

Prof. Brian Scassellati, Yale University, USA

<http://cs-www.cs.yale.edu/homes/scasz/>

Prof. Juyang (John) Weng, Michigan State University, USA

<http://www.cse.msu.edu/~weng/>

Dr. Zhengyou Zhang, Microsoft Research, USA

<http://research.microsoft.com/~zhang/>

Submit papers at <http://www.worldscinet.com/ijhr/ijhr.shtml> with a note “for AMD Special Issue.” Follow information for authors at IJHR.



## Call for Paper (continue)

### Important dates:

Paper submission deadline: September 1, 2006.

Notification of the first review: November 1, 2006.

Revisions due: December 1, 2006.

Final notice of acceptance: February 1, 2007.

Final version manuscripts due: March 1, 2007.

Special issue to appear: June 2007.

## Call for Participation



## Glossary

**Situated learning** takes place in a setting functionally identical to that where the learning will be applied. This contrasts with most classroom learning activities which involve knowledge which is abstract and out of context. Lave & Wenger (1991) put forward this model by using social interaction as an example-- learners become involved in a "community of practice" which embodies certain beliefs and behaviors to be acquired. As the beginner or newcomer moves from the periphery of this community to its center, they become more active and engaged within the culture and hence assume the role of expert or old-timer. Furthermore, situated learning is usually unintentional rather than deliberate.

**Bayesian learning**, sometimes called Bayesian inference, is a statistical method in which evidence or observations are used to update or to newly infer the probability that a hypothesis may be true. Bayesian inference uses aspects of numeric methods, which involves collecting evidence that is meant to be consistent or inconsistent with a given hypothesis. As evidence accumulates, the degree of belief in a hypothesis changes. With enough evidence, it will often become very high or very low. Bayesian inference is a suitable logical basis to discriminate between conflicting hypotheses. Hypotheses with a very high degree of belief should be accepted as true; those with a very low degree of belief should be rejected as false.