

# AAAI Symposium on Developmental Systems

to be held at the

Hyatt Crystal City, Arlington, Virginia October 13-15, 2006

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## Presentation Details

**All submission contributors are expected to** present their work for between 30 - 45 minutes, with questions after. We have left time between talks to discuss key issues in the field and issues that have been raised by authors of submissions, program committee, and reviewers.

**Presenters are asked to** put their work into the larger context of the field: explain how their work adds to the field, as well as how their work is similar/disimilar to that of others. What are the advantages/disadvantages of the author's proposed method/technique over other approaches. Due to the lack of appropriate nomenclature as well as ambiguous overlap with biology, all contributors are asked to think about their terminology and definitions in order that we may attempt to arrive at some sort of consensus regarding definitions. In addition, *the discussion sessions should not be viewed as a time to ask pointed questions solely about the presentations, but rather should be considered as brain-storming sessions with a view to providing direction to an embryonic, but rapidly developing, field.*

## Venue

Hyatt Crystal City, Lincoln Room, Third Floor

## Registration

Registration will be held in the Potomac foyer on the Ballroom level (two levels below lobby level), October 13, and in the Presidents foyer on the third level of the Hyatt, October 14-15. All symposia sessions will be held on the third level of the hotel. A floor plan of the hotel is available at <http://www.crystalcity.hyatt.com/hyatt/hotels/events/index.jsp>.

## Opening Reception and Plenary Session

Please join us for the reception, to be held in Regency AB, ballroom level, at 6:00 pm, Friday, October 13. A choice of pasta, light hors d'oeuvres, wine, beer, and soft drinks will be served. The Plenary Session will be held Saturday, October 14, 5:45-7:15 pm in the Potomac Room, ballroom level. It is open to the public at no additional cost

## Coffee Breaks

The Symposium Series will have one morning (10:30 - 11:00 am) and one afternoon (3:30 - 4:00 pm) coffee break outside the session rooms in the Virginia and Presidents foyers on the third level. Coffee, tea and light breakfast items will be served in the morning, and coffee, tea, soft drinks, water and light snacks in the afternoon. No afternoon break will be held on Sunday.

## About the Symposium

In nature, the processes of biological development have been pivotal in nature's ability to construct adaptable, modularized, and self-repairing systems of incredible complexity. The development of multicellular organisms from a single cell provides a plentiful and rich source of knowledge and inspiration for constructing developmental systems that model biological processes and/or enhance evolutionary design systems.

Development biology-inspired approaches represent a method for facilitating the construction of robust, complex adaptive systems in a more modular and evolvable manner than conventional methods. For example the state of the art in evolutionary robotics involves evolving controllers for robots with fixed morphologies, rather than all aspects of the robot. Artificial developmental systems may be useful for overcoming this limitation: biological

## Symposium Schedule

### October 13:

**9:15 am** - Open  
Developmental Systems  
Symposium - *Sanjeev Kumar,  
Josh Bongard, & Greg Hornby*

**9:25 am** - Keynote Speech -  
"Evolving Complexity: Lessons  
from Biology" *by Prof. Kenneth  
de Jong*

Evolutionary Developmental  
System for Structural Design  
*by Rafal Kicingier*

**10:30 - 11:00 am** COFFEE  
BREAK

Discrete Developmental  
Genetic Regulatory Networks  
for the Evolution of  
Cooperation *by Moritz Buck  
and Chrystopher Nehaniv*

**12:00 pm - 1:30 pm** LUNCH

Development of Virtual  
Embryos with Emergent  
Self-Repair *by Tim Andersen,  
Richard Newman, and Tim  
Otter*

*Discussion*

**3:30 - 4:00 pm** COFFEE  
BREAK

*Discussion* - end 5 pm

*6:00 pm - Reception in  
Regency AB, ballroom level*

### October 14:

**9:30 am** - A Novel  
Developmental System for the  
Study of Evolutionary Design  
*by Adrian Grajdeanu and  
Sanjeev Kumar*

the evolution of modular gene sub-networks and phenotypic modules.

This workshop is intended to stimulate discussion about how best to extract the key principles of biological development as they relate to design of complex artifacts and computation in general. We will focus discussion around the following questions:

- Which mechanisms of biological development are useful as general design principles, and which are only relevant to biological development?
- What purpose does computational development serve?
- What is the current state of computational development and its future?
- What is the relationship between development and evolution in both natural and artificial systems?
- How should we define the terms "development," "morphogenesis," and "regeneration" in our field, as opposed to how they are used in biology?
- How would one compare the design abilities of a standard evolutionary algorithm to a developmental system?
- How can desirable design principles – such as adaptation, evolvability, scalability, and modularity – be maximized in a developmental system?
- What kind of benchmarks and metrics could be used to test and compare different developmental systems?

## Transportation

**From Reagan National Airport:** The Hyatt Regency offers courtesy shuttle service to and from the airport, 5:30 am - 12:30 am. Pickup every 30 minutes at the top of the hour.

**From Metro Rail:** Take the Blue or Yellow line to the Crystal City Station (6am-Midnight Sun-Thurs, 8am-2am Fri/Sat). Take the escalators from the station up to the street. Once you are at the top of the escalators, turn to the left toward the brown Metro sign. The Hyatt shuttles stop at the corner (look for the White\Red Shuttle sign) every 1/2 hour. For pick-up at the METRO, you may also call the hotel directly at 703-418-1234. Complete transportation information, parking information, and hotel directions are available at <http://www.crystalcity.hyatt.com/hyatt/hotels/services/index.jsp>.

**10:30 - 11:00 am COFFEE  
BREAK**

Evolvability in Developmental Systems by *Joseph Reisinger and Risto Miikkulainen*

**12:00 pm - 1:30 pm LUNCH**

On the Relationship between Environmental Noise and Modular Hierarchies by *John Rieffel*

Exploiting Regularity Without Development by *Kenneth O. Stanley*

**3:30 - 4:00 pm COFFEE  
BREAK**

*Discussion* - end 5 pm

**5:45-7:15 pm PLENARY  
SESSION** - Potomac Room,  
ballroom level

**October 15:**

**10:00 am** - A NeuralGroup Basis for Evolving and Developing Neural Networks by *Keith L. Downing*

*Discussion*

**12:00 pm End of  
Symposium**