Curriculum Vita

# Douglas S. Blank

Computer Science
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## Education

*Ph.D. in Computer Science and Cognitive Science*, Indiana University, Bloomington, December 1997

*B.A. in Computer Science*, Indiana University, Bloomington, May 1988

*B.A. in Anthropology*, Indiana University, Bloomington, May 1987

## Research Areas

All of my research can be classified into one of the following two, broad categories:

1. **Computer Science Education** – Gender issues, computer science curriculum development, emergent pedagogy, and open standards in education
2. **Emergent Intelligence** – emergence in natural and artificial systems, developmental robotics, cognitive science, artificial neural networks, learning high-level cognitive abilities, such as analogy-making

## Employment

1. **Assistant Professor,** Computer Science, Bryn Mawr College (2001–present).
2. **Assistant Professor,** Department of Computer Science and Computer Engineering, University of Arkansas, Fayetteville (1996–2001).
3. **Teaching Assistant and Research Assistant**, Computer Science Department and Cognitive Science Program, Indiana University, Bloomington (1990–1996).

## Publications

### Book Chapters

1. with Berghel, H. "The World Wide Web." In M. Zelkowitz (ed.), *Advances in Computing*, v. 48, Academic Press, pp. 178-218, 1999.
2. with Meeden, L.A., and Marshall, J.: "Exploring the Symbolic/Subsymbolic Continuum: A case study of RAAM." In *The Symbolic and Connectionist Paradigms: Closing the Gap*, 1992.

**Journals**

1. with D. Kumar, L. Meeden, and J. Marshall: "Bringing up robot: Fundamental mechanisms for creating a self-motivated, self-organizing architecture." *Cybernetics and Systems*, 36:2, 2005.

2. with D. Kumar, L. Meeden, and H. Yanco: "Pyro: A Python-based Versatile Programming Environment for Teaching Robotics." To appear in the *ACM Journal on Educational Resources in Computing* (JERIC), 2005.

3. "The Radical Alternative to Hybrid Systems." In A. Jagota, T. Plate, L. Shastri, R. Sun (eds), *Connectionist Symbol Processing: Dead or Alive?*, 1-40, a collective article in *Neural Computing Surveys*, 1999.

**Magazines**

1. with D. Kumar, L. Meeden, and H. Yanco: "The Pyro toolkit for AI and robotics." To appear in *AI Magazine*.

2. with L. Meeden: "Developmental Robotics Spring Symposium." To appear in *AI Magazine*.

**Conference and Workshop Proceedings**

1. with L. Meeden (editors): "Developmental Robotics." AAAI 2005 Spring Symposium Working Notes, 2005. AAAI Press.

2. with J. Marshall, and L. Meeden: "An Emergent Framework for Self-Motivation in Developmental Robotics." In *Proceedings of the International Conference on Delevelment and Learning* (ICDL), 2004.

3. with L. Meeden, and J. Marshall: "Self-Motivated, Task-Independent Reinforcement Learning for Robots." In *Proceedings of Real Life Reinforcement Learning* (RLRL), a workshop at the AAAI 2004 Fall Symposium Series.

4. with H. Yanco, D. Kumar, and L. Meeden: "The Karel-the-Robot Paradox: A framework for making sophisticated robotics accessible." Proceedings of the *Accessible Hands-on Artificial Intelligence and Robotics Education*, a workshop in the AAAI 2004 Spring Symposium Series.

5. with D. Kumar, and L. Meeden: "Bringing up robot: Fundamental mechanisms for creating a self-motivated, self-organizing architecture." In *Proceedings of the workshop Growing Up Artifacts that live, Simulated Adaptive Behavior 2002, From Animals to Animats*, Edinburgh, Scotland, August 10–11, 2002.

6. with D. Kumar and L. Meeden: "A Developmental Approach to Intelligence,"in *Proceedings of the Thirteenth Annual Midwest Artificial Intelligence and Cognitive Science Society Conference*, Chicago, IL, April 13–14 2002. Edited by Sumali Conlon.

7. with D. Kumar: "Patterns of Curriculum Design." In *Proceedings of Informatics Curricula, Teaching Methods and Best Practice* (ICTEM), Florianopolis, Santa Catarina, Brazil, July 10–12, 2002.

8. with L. Meeden, T. Newhall, and D. Kumar: "Using departmental surveys to assess computing culture: Quantifying gender differences in the classroom." Innovation and Technology in Computer Science Education (ITiCSE), 2003. Thessaloniki, Greece.

9. with L. Meeden and D. Kumar: "Python robotics: An Environment for Exploring Robotics Beyond LEGOs." *ACM Special Interest Group: Computer Science Education Conference*, Reno, NV (SIGCSE 2003), February 19-23, 2003.

10. with students Em Ward, and Douglas Rolniak, and colleague Dale Thompson: "Complexity as Fitness for Evolved Cellular Automata Update Rules." In *Late Breaking Papers of the 2001 Genetic and Evolutionary Computation Conference* (GECCO), San Fransisco CA, July 7–11, 2001.

11. "Radical Artificial Intelligence: A Postmodern Approach," in *Proceedings of the 2001 Twelfth Annual Midwest Artificial Intelligence and Cognitive Science Society Conference*, OH, 2001.

12. with G. Beavers, and students W. Arensman, C. Caloianu, T. Fujiwara, S. McCaul, and C. Shaw: "A Robot Team that Can Search, Rescue, and Serve Cookies: Experiments in Multimodal Person Identification and Multi-robot Sound Localization," in *Proceedings of the 2001 Twelfth Annual Midwest Artificial Intelligence and Cognitive Science Society Meetings*, 2001.

13. with student B. Mashburn: "Graphics + Robotics + AI = Fast, 3D Scene Construction," In *Proceedings of the 1999 Midwest Artificial Intelligence and Cognitive Science Society Conference*, Bloomington, IN, 1999. AAAI Press.

14. "Is A.I. becoming Robotics? Implications for Research and Pedagogy". A panel presentation at the *1998 Midwest Artificial Intelligence and Cognitive Science Society Conference*, 1998.

15. with student Clark, M. : "A Neural Network-based Cryptographic System." In *Proceedings of the 1998 Midwest Artificial Intelligence and Cognitive Science Society Conference.* 1998, AAAI Press.

16. with Meeden, L.A.: "Use of Robot Simulations can Enhance Integration." Working Notes, AAAI Spring Symposium, AAAI98: Integrating Robotics Research, 1998.

17. with Meeden, L.A.: "Innovation through Competition." Working Notes, AAAI Spring Symposium, AAAI98: Integrating Robotics Research, 1998.

18. Ph.D. dissertation "Learning to See Analogies: A Connectionist Exploration." Indiana University, Bloomington. December 1997.

19. with student Ross, J.O. "Incorporating a Connectionist Vision Module into a Fuzzy, Behavior-Based Robot Controller." In *Proceedings of the 1997 Midwest Artificial Intelligence and Cognitive Science Society Conference*, 1997.

20. with student Ross, J.O.: "Learning in a Fuzzy Logic Robot Controller." In *Proceedings of the 1997 Meetings of the American Association of Artificial Intelligence*, 1997.

21. "Analogy-Making: A Connectionist Exploration." In *Proceedings of the 1996 Midwest Artificial Intelligence and Cognitive Science Society Conference*, 1996.

22. "A distributed representation of multiple objects in a visual scene." In *Proceedings of the 1995 Midwest Artificial Intelligence and Cognitive Science Society Conference*, 1995.

23. with Meeden, L.A., McGraw, G.E.: "Emergent Control and Planning in an Autonomous Vehicle." In *Proceedings of the 15th Annual Cognitive Science Society Conference*, 1993.

24. with Gasser, M.: "Grounding via Scanning: Cooking up Roles from Scratch." In *Proceedings of the 1992 Midwest Artificial Intelligence and Cognitive Science Society Conference*, 1992.

**Technical Reports and Columns**

1. with D. Kumar and L. Meeden: "A Developmental Approach to Anchoring." *Bryn Mawr College Computer Science Technical Report 2002-01*, 2002.

2. with L. Meeden, T. Newhall, and D. Kumar: "Using departmental surveys to assess computing culture: Recognizing and addressing gender differences." *Bryn Mawr College Computer Science Technical Report 2002-02*, 2002.

3. "AI Update." A news/opinion column in *intelligence magazine*, the journal of ACM's Special Interest Group on Artificial Intelligence (SIGART). Spring 2000, Summer 2000, Fall 2000, Winter 2000, Spring 2001, Summer 2001, Fall 2001, and Winter 2001.

4. with L. Meeden: "Robot competitions as class projects," in SIGART Bulletin, Volume 9, Number 2, 1998.

5. with students Hudson, J.H., Mashburn, B.C., Roberts, E.A.: "The XRCL Project: The University of Arkansas' Entry into the AAAI 1999 Mobile Robot Competition." Technical Report CSCE-1999-01, 1999.

6. with Holmes, G., and students Wells, R., and Wolinski, P. (1998). "Interactive Gradebook: The Missing (Hyper)Link." Technical Report CSCE-1999-02, 1999.

## Invited Talks

1. **Growing the Seeds of Cognition**: Midwest AI and Cognitive Science Conference, April 2005. Dayton, OH.

2. **Beyond LEGOs**: Bard College, July 2002. Introduction to advanced robotics for high-achieving high school students in the Hudson Valley region.

   On-line at http://emergent.brynmawr.edu/~dblank/bard/.

3. **Patterns of Curriculum Design**: Villanova University, Nov. 4, 2002, with Deepak Kumar.

## Grants, Proposals, and Awards

1. NSF CCLI-Educational Materials Development, Division of Undergraduate Education, Proposal #0231363 (University of Massachusetts Lowell, Bryn Mawr College, Swarthmore College, and Stanford University), *Beyond LEGOs: Hardware, Software and Curriculum for the Next Generation Robot Laboratory.* Co-PI. $400,194 to begin January 2003, over three years. Funded!

2. *Developmental Robotics*, Mellon Tri-Co Fellow, with Lisa Meeden and Deepak Kumar. $4,000, 2002–2003.

3. *Multidisciplinary Assignments for Computer Science* Bryn Mawr College curriculum development summer stipend. $2,000, summer 2002.

4. NSF 00-126 ITR/AP (CISE), Proposal #0113830 (University of Arkansas, University of Memphis), *Virtual Test Tubes for Biomolecular Information Processing.* Co-PI. $462,706 over two years. Not funded.

5. NSF 97-51, Proposal #98AR003, (University of Arkansas, Fayetteville), *Infrastructure Development Support For New Research Programs in Computer Engineering & Computer Science.* Co-PI. $1,338,713 over two years. Not funded.

6. NSF 99-29, Proposal #9976380 (University of Arkansas, Fayetteville), *A Hybrid Adaptive System for the Emergent Control of a Global Power Network.* PI. $662,868 for three years. Not funded.

7. *Technical Excellence Award* in the *Hors d'oeuvres Anyone?* robot competition at the American Association of Artificial Intelligence Conference, 2000, for research in **vision-based person recognition**.

8. *Technical Excellence Award* in the *Hors d'oeuvres Anyone?* robot competition at the American Association of Artificial Intelligence Conference, 1999, for research in **on-line voice recognition learning**.

## Collaborators

NSF Proposal Collaborators: David Andrews (University of Arkansas, Fayetteville), Dennis Brewer (University of Arkansas, Fayetteville), Russell Deaton (University of Arkansas Fayetteville), Max Garzon (University of Memphis), Kurt Konolige (Stanford University), Deepak Kumar (Bryn Mawr College), Lisa Meeden (Swarthmore College), Kraig J. Olejniczak (University of Arkansas, Fayetteville), Mitchell Thorton (University of Arkansas, Fayetteville), David Touretzky (Carnegie Mellon University), Holly Yanco (University of Massachusetts, Lowell), and Edwin E. Yaz (University of Arkansas, Fayetteville).

Other collaborations: Gordon Beavers (University of Arkansas, Fayetteville), Michael Gasser (Ph.D. advisor, Indiana University, Bloomington), Brain Mashburn (masters advisee, University of Arkansas, Fayetteville), Tia Newhall (Swarthmore College), Dale R. Thompson (University of Arkansas, Fayetteville).

## Course and Materials Development

### Courses Taught

- **Cognitive Science** - Fall 2001, new course at BMC. An overview of the field for advanced psychology, computer science, and philosophy students. Nine students.
- **Introduction to Computer Science** - Fall 2001. An introduction for majors and non-majors in Java. Covered programming, graphical components, objects, and overview of the science of computing. Eighteen students.
- **Androids: Design and Practice** - Spring 2002, new course at BMC. An introduction to autonomous robots, starting with small, wheeled robots, and progressing to a humanoid-sized pair of robotic arms. Eight students.
- **College Seminar: Robots Gone Berserk** - Spring 2002, new course at BMC. A second-semester writing course for sophomores that examined the science and ethics of robotics through science writings, science fiction, and film. Taught with Liz Nutting. As part of this course, brought performer Tom Sgouros to perform *Judy: What is it like to be a robot?* for the college, and on behalf of the Center for Science in Society. Seventeen students.
- **Data Structures** - Fall 2002. A continuation of the Introduction of Computer Science heading into data structures, algorithms, object-oriented programming, and analysis. Two students.
- **Programming Languages** - Fall 2002, new course at BMC. A look deep look at programming language concepts by developing our own language. Based on the classic "Essentials of Programming Language." Seven students.

- **Developmental Robotics** - Fall 2003, new course at BMC. An exploration of the emerging field. Included topics in machine learning, cognitive science, and developmental robotics.

**Materials**

1. **Emergent Intelligence Laboratory**: established my research laboratory from my start-up funds, and teaching funds from the Department of Mathematics.
2. **Emergent Wiki**: created Bryn Mawr College's first Wiki Wiki Web, a web site that can be edited by anyone. The web site has been used extensively in the computer science CSEMs, as well as for collaborative activities in the Emergence Research Group, and Developmental Robotics, and others.

   On-line at http://emergent.brynmawr.edu/.
3. **Edventure Course Management System**: created an open source course management system that operates much like Blackboard.

   On-line at http://dangermouse.brynmawr.edu/edventure/.
4. **Serendip: Cognition and Consciousness**: maintaining the Serendip webpages, under direction of Paul Grobstein.
5. **Pyro: Software for robotics**: developed a software framework such that introductory students can interact with advanced issues in cognitive science, artificial intelligence, and robotics. This software forms the foundation of the Developmental Robotics course (above), research group (below), and the NSF CCLI grant (above).
6. **The CS Hall Monitor**: developed a dynamic computer monitor that now resides in the "computational hallway" of the second floor of Park Science Building.

## Synergistic Professional Activities

**Research Groups at BMC**: Language Working Group; Science in Society Brown Bag Discussion; Emergence Systems: A Discussion; and Developmental Robotics.

**BMC Committees**: Member of the Computer Activities Committee (COAC); computational biology search committee (selected Ted Wong); UNIX system administrator search committee (selected Chris Couples); active participant in the Science Node meetings (especially during the summer of 2002).

**Referee**: Transactions on Robotics and Automation; Midwest Artificial Intelligence and Cognitive Science Conference Conference Proceedings; Consortium for Computing in Small Colleges Conference Proceedings.

**Community**: active and founding member of the Philadelphia Python User's Group; created Season of Software Freedom, an international celebration of free software.

**Affiliations**: AAAI, ACM, SIGCSE.

**Related Conference activities**:

- Conference organizer and proceedings editor (with L. Meeden) of the 2005 AAAI Spring Symposium on *Developmental Robotics*.
- Conference organizer and proceedings editor of the *Midwest AI and Cognitive Science Society Meetings*, April 2000, Fayetteville, AR.

- Member of Program Committee of Robolearn-96 workshop at FLAIRS, Florida AI Research Symposium, Key West, FL.
- Participant of IJCAI 2001 Workshop on Effective Interactive AI Resources, Seattle, WA. On the program committee for the same group for AAAI, 2002.

**Past Research/Teaching activities:**

- Competition organizer for the **2005 Scavenger Hunt** event, AAAI national meeting this summer, Pittsburgh, PA.
- Competition organizer for the **1998 Find Life on Mars** event, AAAI national meeting, Madison, WI.
- One of the Organizer of Boosting Science, Engineering, and Technology (BEST), to introduce high school students to robotics in Fayetteville, AR.
- Invited Panel Participation: "Dimensions of Difference: Symbolic vs. Subsymbolic Computation." Topic: Subsymbolic Representations. Third Midwest Artificial Intelligence and Cognitive Science Society Conference, Southern Illinois University, Carbondale, Illinois, April, 1991.
- Presentation: Self-controlled Recurrent Networks. Third Annual Midwest ConnectFest, Pittsburgh, PA, November, 1992.
- Presentation: Analyzing Representations in Sequential Recursive Auto-Associative Memory (RAAM), First Annual Midwest ConnectFest, Bloomington, IN, November, 1990.
- 1990-1991 President, Indiana University Computer Science Graduate Student Association.
- 1989-1990 Indiana University Graduate Student Organization Departmental Representative, Computer Science Graduate Student Association.
- 1987-1989 President, Indiana University Association of Computing Machinery, local chapter.