CURRICULUM VITAE

Billy Harris
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Academic Degrees

Doctor of Philosophy, May 2002, emphasis on Artificial Intelligence,
University of Texas at Arlington, Arlington, TX.
Advisor: Diane Cook
Dissertation Committee: Diane Cook, Frank Lewis, Larry Holder, Manfred Huber, Lynn Peterson
Title: Improving the Efficiency and Applicability of Machine Planning

Master of Science, May 1995, majoring in Computer Science and Engineering,
University of Texas at Arlington, Arlington, TX.
Advisor: Diane Cook
Thesis Committee: Diane Cook, Larry Holder, Erik Matella
Topic: Analysis of Hierarchical Planning

Bachelor of Science, May 1993, majoring in Electrical Engineering, with Computer Engineering concentration, University of Texas at Austin, Austin, TX.

Research Interests

Machine Planning, Scheduling, Manufacturing Resource Planning

Statement on Research

Although artificial intelligence attracts a great deal of interest and imagination, too often AI researchers focus on unscalable toy problems or design systems based around a theoretical model rather than practical utility. I have spent my research career designing and evaluating techniques to improve the efficiency of AI reasoning [particularly the field of Machine Planning], and to allow for easier integration of AI algorithms into non-AI systems.

My PhD work focused on integrating a machine planning system with a prototype manufacturing workcell in use at the Automation and Robotics Research Institute. The workcell, used as a testbed for intelligent control, has three robots, three conveyors, and two simulated workcells which perform operations on Lego 'parts.' The workcell uses four matrices to control part routing and operation sequencing. I have shown that an AI planning system can generate these four matrices, which were formerly designed by hand. By separating operation sequencing, resource assignment, and part routing, I created an AI system that performs a useful high-level task without being overwhelmed by information more easily handled by a real-time controller.

Currently I am investigating how my planning system can support dynamic part routing decisions. Other future areas of research include error recovery, and integration of scheduling information with planning and manufacturing.

Statement on Teaching

When I teach, I use PowerPoint slides as a teaching aide. The slides cover important concepts, figures reproduced from the text book, and above all example problems. Even through the slides are prepared on PowerPoint and are available online, I present them as traditional transparency slides. This allows me to pose a question to class, and write down whatever answer is given. Through class discussion, we refine or replace incorrect answers, and I point out subtleties with the prepared problem.

I try to have my lectures in two parts (though not necessarily of equal time). First I present the material as equations, theorems, or principles. Then, I show/solve a sample problem which makes use of the knowledge. As an engineer, I see problem-solving as a key skill to be developed throughout academic studies, and so I see in-class design and problem-solving as a good thing.

Something else I consider distinctive about my lecture style is an effort to communicate not just the uses but also the limits of whatever concept is under discussion. For example, a slide for a C++ class may have two examples of a proper use of the language structure, a third which is technically correct but has a surprising result, and perhaps two more which are subtly incorrect usage of the language structure. I think that seeing both correct and incorrect usage gives the students a deeper understanding of the material in question, and also prepares them for team assignments where their teammates may be the one who use the incorrect form.

I tend to be causal about the lectures themselves, and invite questions throughout the presentation. I find another advantage to printing PowerPoint to transparencies is that by switching from a preprinted slide to a blank slide, I can seamlessly integrate additional examples or detailed questions into the lectures.

Courses Taught

- Computer Architecture
- Digital Logic Design
- Assembly Language
- Theoretical Concepts
- Discrete Structures
- Object-Oriented Programming Using C++
- Design and Analysis of Algorithms (distance education version)

Honors and Awards

- CSE@UTA Outstanding Assistant Instructor Award, 2002
- Inducted into UPE (honor society), 1999
- Outstanding Teaching or Service Award, 1999
- Inducted into Sigma Xi (The Scientific Research Society), 1998
- National Science Foundation Graduate Research Traineeship, 1993-1997
- National Merit Scholarship, 1989-1993
- Engineering Scholarship, 1989-1993
- IEEE Outstanding Officer Award, 1993
- Inducted into HKN (honor society), 1991

Professional Experience

August 2002 – Present
Assistant Professor, Department of Computer Science, University of Tennessee at Chattanooga, TN.

Fall 1998 – August 2002
Assistant Instructor, Department of Computer Science and Engineering, University of Texas at Arlington, TX.

Spring 1994 – Spring 1998
National Science Foundation Graduate Research Traineeship.

Fall 1993
Teaching Assistant for Computer Literarcy, Department of Computer Science and Engineering, University of Texas at Arlington, TX.

Summer 1992
Instructor for Texas Governor's Honors Program, Lamar University

Summer 1992
Research Assistant for Gulf Coast Hazardous Substance Research Center.

Summer 1990 and 1991
Guest Lecturer for Texas Governor's Honor's Program.

Publications

Journal Articles

1. B. Harris, F. Lewis, and D. J. Cook, "Machine Planning for Manufacturing: Dynamic Resource Allocation and On-line Supervisory Control", *Journal of Intelligent Manufacturing,* **9**(5) 413-430, October 1998.

2. B. Harris, D. J. Cook, and F. Lewis. "Automatically Generating Plans for Manufacturing," *Journal of Intelligent Systems,* **10**(3) 279-319, 2000.

3. B. Harris, F. Lewis, and D. J. Cook. "A Matrix Formulation for Integrating Assembly Trees and Manufacturing Resource Planning (MRP) with Capacity Constraints," *Journal of Intelligent Manufacturing,* **13**(4) 239-252, August 2002.

Conference Proceedings

1. B. Harris, and D. J. Cook, "Integrating Hierarchical and Analogical Planning", *Florida AI Research Symposium*, May 1998.

2. B. Harris, D. Cook, and Frank Lewis "Part Routing in an Automated Manufacturing System", *Parallel and Distributed Processing Techniques and Applications*, June 2002.

Workshop Presentations

1. B. Harris, D. J. Cook, and F. Lewis. "Using Machine Planning to Design Manufacturing Plans", *AAAI Fall Symposium on Machine Planning and Autonomous Agent Architecture*, October 1998.

2. B. Harris, D. J. Cook, and F. Lewis. "Combining Representations from Manufacturing, Machine Planning, and Manufacturing Resource Planning (MRP)," *AAAI 2000 Workshop on Representational Issues for Real-World Planning Systems,* August 2000.

References

Dr. Diane Cook, Department of Computer Science and Engineering, University of Texas at Arlington, Arlington, Texas, 76019. cook@centauri.uta.edu.

Dr. Frank Lewis, Automation and Robotics Research Institute, 7300 Jack Newel Blvd South, Fort Worth, Texas, 76118. flewis@arri.uta.edu.

Dr. Larry Holder, Department of Computer Science and Engineering, University of Texas at Arlington, Arlington, Texas, 76019. holder@banzai.uta.edu.

Dr. Lynn Peterson, Department of Computer Science and Engineering, University of Texas at Arlington, Arlington, Texas, 76019. peterson@cse.uta.edu.