



The University of Georgia

AI Newsletter

Institute for Artificial Intelligence
The University of Georgia
Athens, GA 30602-7415 U.S.A.

Spring/Summer 2014

Dr. Wright Named Willson Center Research Fellow

Dr. Sarah Wright, Associate Professor of Philosophy and undergraduate coordinator for the AI Institute's AB in Cognitive Science, was recently awarded a Willson Center Research Fellowship for the 2014-2015 academic year. The Fellowship, created to foster research in the humanities and arts, provides course release from two courses in the academic year. Dr. Wright's project, "A Comprehensive Neo-Stoic Virtue Epistemology", will result in a book on virtue epistemology. Deviating from standard approaches that place heavy emphasis on the reliability of the virtues or consider only Aristotle, Dr. Wright's alternative focuses on a philosophical school spanning centuries and which can be applied to contemporary problems in epistemology.

Dr. Wright is one of fifteen recipients of the award this year. **Dr. René Jagnow**, Associate Professor in the Department of Philosophy, was also named.



Dr. Sarah Wright

Dr. Doshi Named Co-PI on Interdisciplinary Research Grant

Dr. Prashant Doshi, Associate Professor in the Department of Computer Science and AI faculty member, has been named Co-PI on a grant awarded through UGA's Interdisciplinary Proposal Development (IDP) Grant Program. The program, sponsored by the Office of the Senior Vice President for Academic Affairs and the Office of the Vice President for Research, supports interdisciplinary teams of faculty on projects potentially leading to large grants from government and other external sources.

Dr. Doshi's project is "Developing RoboSTEM, a collection of open educational resources to help elementary school teachers teach STEM subjects through robotics and design-based learning". Dr. ChanMin Kim, assistant professor in the College of Education, heads the project. 2014 is the first year for the IDP grants, and the RoboSTEM project was one of six projects funded out of fifty proposals.

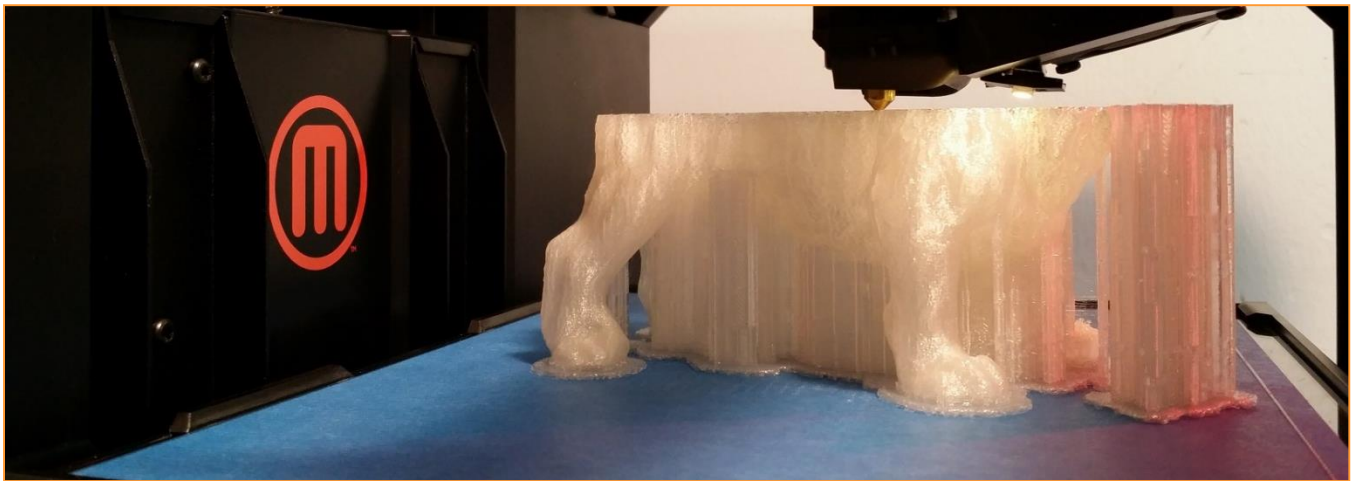
Dr. Maier Receives Faculty Research Grant

In May, **Dr. Fred Maier** was awarded \$9,933 for a proposal submitted to the UGA Faculty Research Grants program. That program, administered by the Office of the Vice President for Research and sponsored by the University of Georgia Research Foundation, provides seed funds for research. Dr. Maier's project, "Distributed Automated Reasoning in Mobile Devices", will investigate knowledge representation and reasoning formalisms suitable for implementation on smart phones and other small devices, and it will develop a library of software tools based on these formalisms.

IT Changes, New Institute Website

During the summer, the AI Institute will hand over administration of many of its lab and office computers to Franklin College's Office of Information Technology (OIT), an organization already responsible for meeting the IT needs of several academic units in the College. Among the computers managed by OIT will be six new lab machines, each with a peppy Intel Core i7 processor and 16 gigabytes of RAM. Also, the Institute's website, currently hosted on a server located in the Institute's office suite, will be replaced by a Drupal-based site hosted on OIT machines. The Institute will continue to maintain its own computation and development machines.

The changes will provide increased security and stability, but it will also be easier for Institute students and faculty to access materials from campus and from home. Additionally, the new website, which uses a theme common to all Franklin academic units, will better identify the Institute as part of Franklin College.



3D Printing!

3D printing has been around since the 1980s, but for much of its history it was never particularly suitable for widespread use. That's changed, however, and very suddenly there are many companies providing low-cost 3D printers to hobbyists and professionals. It's an exceptionally exciting time, in many ways similar to the birth of the personal computer in the late 70s and early 80s.

With funds provided by Franklin College of Arts and Sciences, the Institute has acquired a MakerBot Replicator, together with a digitizer for scanning objects. MakerBot is perhaps the best known manufacturer of 3D printers, and the 5th Generation Replicator, which uses extruded thermoplastics to additively construct three dimensional objects, is one of its most recent models. One obvious use for the printer is in the development of custom robot parts for robots, used either in courses or in research. However, it's easy to see other uses as well, e.g. in the development of computer vision algorithms to construct 3D models, or heuristics to optimize the build process.



Course Focus: Child & Adolescent Development for Education

Child & Adolescent Development for Education (EPSY3010-SL) is a service-learning course in which undergraduate students—in recent years, approximately 80% cognitive science majors—carry out the service of tutoring young children to read at Fowler Drive Elementary. Fowler Drive Elementary is a high poverty public elementary school tucked away in a quiet neighborhood in the northeast corner of Athens-Clarke County. It is notable for undergoing a dramatic change over the last decade, becoming one of the best in the district. In addition to obtaining new leadership (Ms. Anissa Johnson is principal), the Clarke County School District entered into a partnership with UGA's College of Education several years ago. Children at the school have become accustomed to pre-service teachers and other university students assisting with their learning.



PhD Student Matthew Westmoreland

EPSY3010-SL is taught by AI faculty member **Dr. Paula Schwanenflugel**. Approximately two-thirds of course topics are related to cognitive science and the other third to general child development. The cognitive science students are taught the basics of tutoring reading, and Dr. Schwanenflugel and her assistant **Matthew Westmoreland** ensure that the tutoring is carried out professionally. They also carry out brief testing to monitor the progress of the child readers. Among the products for EPSY3010-SL, students produce a final report about their activities and child progress. Sometimes these are used in decision-

making at the school to target possible programs that might be beneficial for the children. According to reports from the Spring 2014 term, 13 out of 15 students made improvement in skills. This program cannot take full credit for the children's improvement, but it probably helped children make gains.

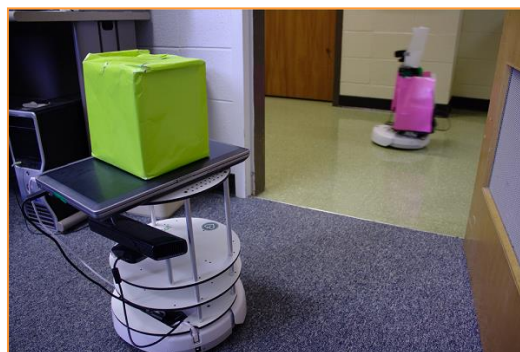
The course provided 15 tutors and approximately 24 tutoring sessions per tutee. That's 360 tutoring sessions in the Spring 2014 term. The Fowler Drive Elementary teachers are extremely helpful in guiding the cognitive science students as well. It is an ideal partnership. According to Dr. Schwanenflugel, the older children (grades 3-4) in particular benefitted from the tutors, and the children seemed to gain motivation from the sessions. The tutors themselves were encouraged by the children's excellent attitudes. The kindergarten children's early word reading skills improved immensely.

What is interesting about this service-learning course is that it is populated mostly with cognitive science majors. This is not a likely setting for cognitive science, but it appears that it should be. The training of the cognitive science students lends itself naturally to the educational setting. The Cognitive Science advisor (**Dr. Sarah Wright**) has indicated that she believes this kind of experience to provide an essential element in helping students to contextualize their knowledge about cognition. On that score, the students generally made sophisticated observations regarding the cognitive processes of their tutees. Further, the students cooperated around car-pooling to the school, so they were a little "green" too.

New Learning Algorithm for Multi-Robot Systems

In May, Computer Science PhD student **Ken Bogert** and **Dr. Prashant Doshi** presented a paper at the 2014 International Conference on Autonomous Agents and Multi-Agent Systems in Paris. The paper addresses a problem commonly faced when learning in the real world, namely occlusion of the entity or process the learner is trying to observe. This problem is particularly present when learning occurs in a multi-robot setting, where the robot learner must rely on its on-board sensors for observations and the behavior of the other robots may be interrupted due to robot-to-robot interactions.

The paper describes a modification of an existing Inverse Reinforcement Learning algorithm to work in a multi-robot context by modeling the interaction as a game the robots play. The new algorithm simultaneously learns the reward function of all the robots as well as the Nash equilibrium of their interaction game. The paper shows that the technique can work even with extreme occlusion of the state space.



Other News

- On April 3rd, AI-faculty member **Dr. William Kretzschmar** received the Friend of UGA at Oxford Award, given by UGA's Office of International Education at its annual International Awards Reception. The reception honors those who advance the university's internationalization efforts through teaching, research, or service.
- In May, the U.S. Preventive Services Task Force, a panel of experts which makes annual reports to Congress, published its final recommendation on Hepatitis B, recommending screening for several categories of at risk individuals. **Dr. Mark Ebell**, Professor of Epidemiology and AI faculty member, became a member of the task force in 2012.
- In October, the Philosophy Department hosted the 2013 Southeastern Epistemology Conference, organized by **Dr. Sarah Wright**. Participants from several universities in the region attended. Dr. Wright presented her paper, "The Stoic Epistemic Virtues of Groups".
- On March 26th, **Dr. Lois Delcambre**, Professor of computer science at Portland State University, visited UGA as a guest of the Faculty of Robotics. Dr. Delcambre, who gave a talk during her visit, is an expert in database data models.
- In April, the Department of Computer Science established a CUDA Research Center, offering training and support for research utilizing CUDA-based parallel computation. CUDA is a parallel computing platform developed by NVIDIA, allows the use of graphics processors for computation-intensive applications.

Recent Graduates

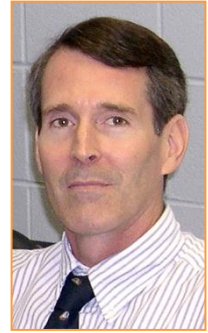
The AI Institute would like to extend congratulations to all recent graduates of the AB and MS programs.

AB in Cognitive Science: Nadia Ahmed, Brook Bagwell, Jacob Beckham, Johana Elangwe, Shane Hayduk, Courtland Hyatt, Warren McCormick, William McCormick, Phillip Oberkofler, Tanya Siclait, James Smith, Samuel Ward

MS in Artificial Intelligence: Karl Fezer

Letter from the Director

Welcome to the summer edition of the IAI newsletter! Fred Maier, our new research scientist, has been doing a fantastic job getting things organized, and moving on several collaborative research initiatives with folks from across campus. We're just coming up on his one year anniversary. Besides research initiatives, Fred has been very involved with the Franklin College of Arts and Sciences technology support services folks and the Institute's transition to their IT umbrella which will help reduce our burden for IT services within the Institute as well as provide a more reliable infrastructure for the Institute (mainly for students and their access to our computing services). Yikes, sort of a long sentence. One especially cool IT news item is our recent acquisition of a MakerBot Replicator (Generation 5), a 3-D printer. We picked up a scanner as well and have been tinkering with both the past few weeks. It's awesome to see it in action.



Since the last newsletter, I've only heard from a few MSAI alumni but we know there are many out there who haven't touched base recently, so please do. Ernie Foster (2002), with Veloxiti, Inc. in Atlanta contacted us about hiring new graduates. Eric Morris (2005) just emailed to say hello. He's with Georgia Power in Atlanta. Nithya Vembu (2011) has been applying to MBA programs, and I believe she is attending North Carolina State this fall. Another alumnus returning to school is David Robinson (2012). He plans to start the Ph.D. program in Computer Science here at UGA this fall. Again, I encourage you to let us hear from you. As I mentioned last time, we are always keen to hear about your latest activities. Keep in touch!

— Don Potter, Director

Selected Publications and Presentations

1. Haosha Wang and Khaled Rasheed, "Artificial Intelligence in Clothing Fashion", in Proceedings of the 2014 International Conference on Artificial Intelligence (ICAI 2014), 2014.
2. Shu Zhang, Roi Ceren and Khaled Rasheed, "Evolmusic: A Preference Learning Accompanist", in Proceedings of the 2014 International Conference on Genetic and Evolutionary Methods (GEM 2014), 2014.
3. Shu Zhang, C. Thomas Bailey and Khaled Rasheed, "Evac: An Evolutionary Accompanist", in Proceedings of the 2013 International Conference on Genetic and Evolutionary Methods (GEM 2013), pp. 69-75, 2013.
4. Xia Qu, Prashant Doshi, "Behavioral Modeling of Sequential Bargaining Games: Fairness and Limited Backward Induction", presented at the 2014 International Symposium on Artificial Intelligence and Mathematics (ISAIM 2014), Fort Lauderdale, FL, USA, Jan. 6-8, 2014.
5. Uthayasankar Thayasivam and Prashant Doshi. "Speeding Up Iterative Ontology Alignment using Block-Coordinate Descent." *Journal of AI Research*, in press.
6. Ekhlhas Sonu and Prashant Doshi. "Scalable Solutions of Interactive POMDPs using Generalized and Bounded Policy Iteration." *Journal of AAMAS*, in press.
7. Kenneth Bogert and Prashant Doshi "Multi-Robot Inverse Reinforcement Learning under Occlusion with Interactions," in Proceedings of the 2014 International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS 2014), pp. 173-180.
8. Muthukumaran Chandrasekaran, Prashant Doshi, Yifeng Zeng and Yingke Chen. "Team Behavior in Interactive Dynamic Influence Diagrams with Applications to Ad Hoc Teams (Extended Abstract)", in Proceedings of the 2014 International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS 2014), pp. 1559-1560.
9. Prashant Doshi, Xia Qu and Adam Goodie. "Decision-Theoretic Planning in Multiagent Settings with Application to Behavioral Modeling", in *Plan, Activity, and Intent Recognition*, ed. Sukthankar, et al. (Elsevier, 2014), 205-224.
10. Charles Cross and Floris Roelofsen "Questions". Stanford Encyclopedia of Philosophy, 2014.
11. Mustafa V. Nural, John A. Miller, and Ismailcem Budak Arpinar. "Improving Entity Linking Performance Using Frame Semantics", in Proceedings of the IEEE Seventh International Conference on Semantic Computing (ICSC 2013), pp. 56-63.

How to Sponsor Research

As an industrial partner or associate of the IAI, you can be involved in our research in four ways:

Collaboration, especially student projects. It doesn't necessarily cost anything to work with us. We are always looking for good research topics, especially for master's theses.

Sponsored research. You can contract with us through the University of Georgia Research Foundation (UGARF) to do research for your company. *We are always looking for research sponsors.*

Donations. If you don't need confidentiality or a specific deliverable, you can simply make a gift to the IAI designated to support a particular research program. Donations are fully tax-deductible.

Consulting. You can hire faculty members or graduate students to work for you part-time as independent contractors. The University encourages this. It's a good way to do a small project with a high level of confidentiality.

