



The University of Georgia

# AI Newsletter

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

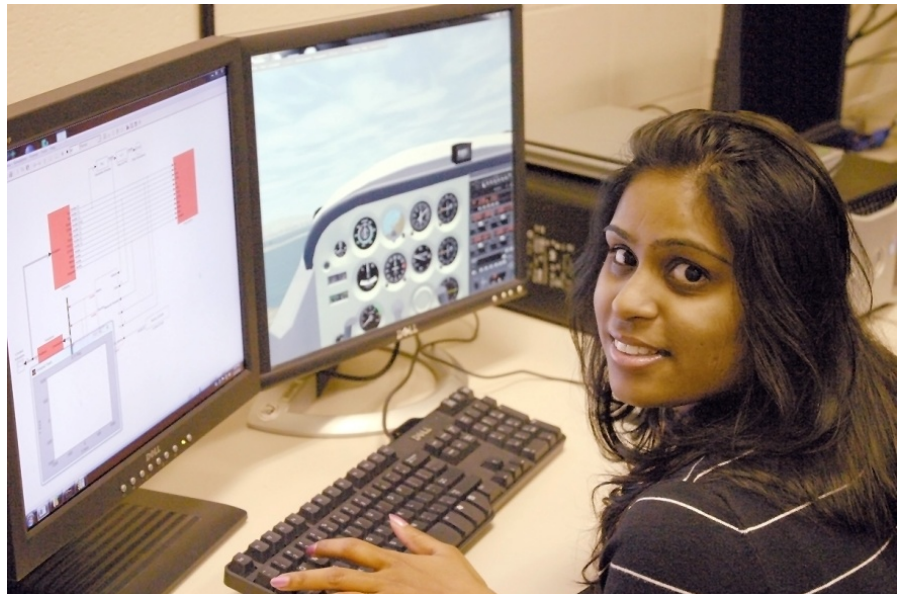
Fall 2011

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## Research Spotlight: Flying an Autonomous Aircraft

Two recent master's thesis projects use artificial intelligence to control an unmanned aerial vehicle (UAV).

Swetha Pandhiti (see picture) implemented a blackboard architecture for controlling a UAV using fuzzy inference. That is a system of logic in which statements are true to a degree (anywhere from 0 to 1) instead of just true or false. Her system replaces the traditional PID (proportional-integral-derivative) algorithms used to control aircraft. The thesis was directed by Dr. Don Potter.



In a separate project also directed by Dr. Potter, Yan Qu combined fuzzy logic with machine learning. His Learning Fuzzy Classifier System (LFCS) stores and evolves a sophisticated set of rules for the UAV controller, able to deal with uncertainty in both its internal state and its external environment.

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## Research Spotlight: New Group Explores Financial AI

A new research group is exploring artificial intelligence applications in the financial sector. Called FinITA (Financial Intelligent Text Analysis), the group is led jointly by AI faculty members Michael Covington, Janine Aronson, Don Potter, and Khaled Rasheed. Much of the group's interest focuses on making financial predictions from news reports, SEC filings, and other English-language texts, and on extending the work of UGA Linguistics alumna Dr. Cati Brown on detecting deception in language.



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## News: Kretzschmar, Van Liefferinge Join AI Faculty

The arts and humanities are better represented than ever before as the Institute welcomes two new Faculty Fellows, Dr. Bill Kretzschmar of the Department of English and and Dr. Stefaan Van Liefferinge of the Lamar Dodd School of Art. Dr. Kretzschmar, Willson Professor of Humanities, studies mathematical modeling of language change and maintains a geographic information system of American English dialect data. Dr. Van Liefferinge's specialty is medieval architecture, but he has a background in physics and software engineering and has for some time been the driving force behind the Institute's ARC project (Architecture Represented Computationally).

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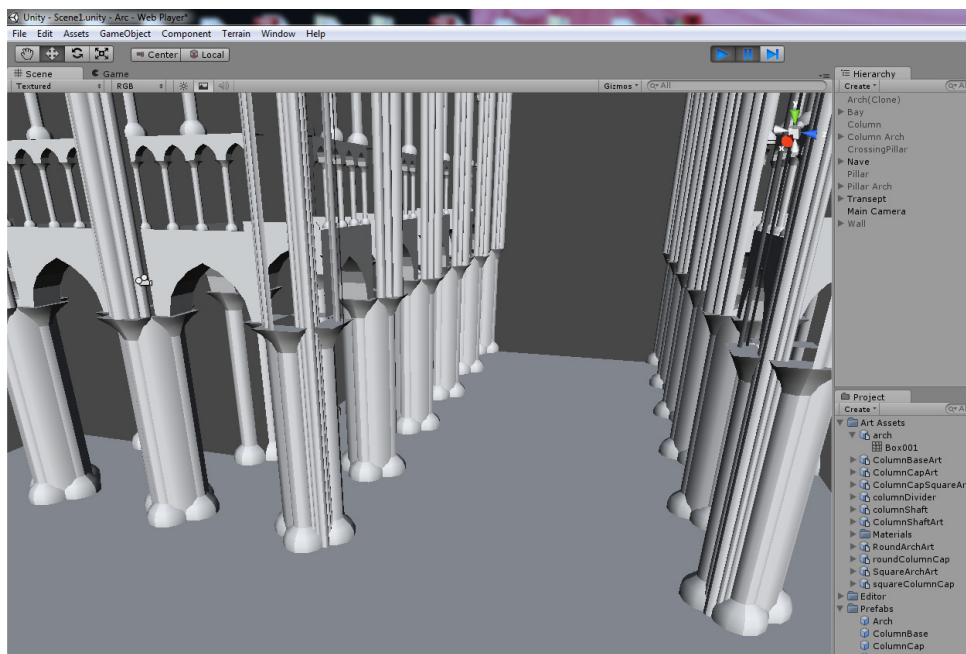
## Research Spotlight: Intelligent Modeling of Gothic Cathedrals

After more than a year of work with internal and external funding, the Institute's "cathedral project" (more formally, ARC, Architecture Represented Computationally) has made great progress toward modeling parts of an expert historian's knowledge of Gothic cathedrals.

Graduate students Tyler Carlson and Eli

Holt are tackling knowledge representation and are creating an extended Prolog inference engine for the purpose. Graduate student Zane Everett is handling graphical output (shown above). The challenge is to put together knowledge of different kinds, from different sources, always incomplete and relying on defaults, to make a coherent representation of a building.

Why Gothic cathedrals? Because they have a well-defined structure with definite components, elaborate but much less variable than other kinds of architecture.




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## News: Geddes, Jarus, Thompson, Arford, Flannery visit IAI

Industry visitors during fall semester included Norm Geddes of Applied Systems Intelligence, Michael Jarus of Knowlagent, and Darnell Arford and Jim Flannery of the Four Athens Technology Incubator. If you're an Industrial Partner or Associate, let us give you an opportunity to come by and meet our students and faculty. Contact Michael Covington at [mc@uga.edu](mailto:mc@uga.edu).

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## A Student's Story: Karthik Nadig

*Karthik Nadig is currently a candidate for the master's degree in Artificial Intelligence. He tells his story as follows:*

Born and raised in Mysore, Karnataka, India, I spent a large portion of the childhood dismantling radios, TVs, and clocks to learn how they worked. I was introduced to programming when I was 12 and I have been coding ever since. My interests are not limited to technology; I am a self taught artist and used to play the piano.



I've had a very interesting time at UGA, and I made very smart friends here. Some of the projects that I have been working on include, but not limited to, extending the Windows system clipboard to cloud computing, designing RF coils for a MRI machine using evolutionary techniques, predicting weather to prevent frosting of produce, and much more. I also built an object-avoiding robot that evolves the object avoidance logic, and the paper that was accompanying the project received the second best paper award at IEA/AIE 2011.

Studying at UGA gave me the opportunity to intern at Microsoft; I worked with the kernel team on Windows 8. I had the most amazing summer at Microsoft and working with very smart and experienced developers motivated and inspired me to pursue a career related to that work.

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## Letter from the Director

Welcome to the fall newsletter! As always, we hope you enjoy receiving the IAI Newsletter and keeping up to date on all the cool activities we have going on. Feel free to send us your comments and suggestions about the newsletter any time; we are always glad to hear from you (just got a note last week from Andreas Siebert, MSAI'91).



Both the AB in Cognitive Science and the MS in Artificial Intelligence continue to flourish. It's hard to believe but the undergraduate Cognitive Science program has grown to nearly 70 majors. Special congratulations to Ms. Jessica Tinker; she was invited to join the Phi Beta Kappa honorary society. Jessica is a cognitive science and psychology double major. In the MSAI program, we've had four students graduate so far this year: Ms. Nithya Vembu, Ms. Soumya Shivakumar, Mr. Yan Qu, and Ms. Swetha Pandhiti. Yan traveled to Syracuse this summer to present a paper (co-authored with Swetha, Karl Fezer, computer science student Kalesha Bullard, and me) on our UAV project at the IEA/AIE'11 conference. Karthik Nadig presented another paper at the same conference co-authored by Muthu Chandrasekaran (MSAI'10; now doing his PhD in CS), and Khaled Rasheed. Karthik's paper won best student paper honors.

The Institute continues to run fairly smoothly. Our only real hurdle has been the timely scheduling of AI courses, especially those taught by computer science. Fortunately, we have been successful in acquiring temporary instructional support from the Dean. We have also petitioned the Dean for two permanent lecturer positions to be housed within the Institute (the good news is that our proposal has not been rejected as yet!).

Again, enjoy the newsletter, and have a safe and happy holiday season.

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## Recent Theses

Yan Qu, *An Unmanned Aerial Vehicle Controller Based on a Learning Classifier System*

Swetha Pandhiti, *Blackboard Architecture for an Unmanned Aerial Vehicle Controller Using Fuzzy Inference Systems*

For a copy of any thesis, e-mail [shbrooks@uga.edu](mailto:shbrooks@uga.edu) or see [http://www.ai.uga.edu/IAI/graduates\\_of\\_AI.htm](http://www.ai.uga.edu/IAI/graduates_of_AI.htm).

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## Selected Publications and Presentations

Janine E. Aronson and Kumar Ujjwal, "Cyber Haggler: Intelligent Web-based Bargaining by Genetic Algorithm Agents," Decision Sciences Institute, National Conference, Boston, MA, November 2011.

Michael A. Covington, "Schizophrenia, Linguistics, and Computers: Work in Progress," invited presentation, Emory University, November 15, 2011.

Prashant Doshi, "Utilizing Partial Policies for Identifying Equivalence of Behavioral Models," oral presentation, Twenty-Fifth Conference on Artificial Intelligence (AAAI), San Francisco, August 2011.

Prashant Doshi, "Automated Composition of Web Services: Moving Beyond Toy Problems," invited talk at IBM India Research Lab and Infosys SET Labs, Bangalore, India, January 2011.

Adam S. Goodie, P. Doshi, and D. L. Young, "Levels of theory-of-mind reasoning in competitive games," *Journal of Behavioral Decision Making*, in press.

W. D. Potter, "Robots in Our Future," sponsored by Ideas for Creative Exploration (ICE), University of Georgia, October 24, 2011.

W. D. Potter, "Forest Planning Using Particle Swarm Optimization with a Priority Representation", 24th International Conference on Industrial, Engineering & Other Applications of Applied Intelligent Systems (IEA/AIE-2011), Syracuse, NY, June 28 -- July 1, 2011.

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## How to Sponsor Research

As an industrial partner or associate of the IAI, you can be involved in our research four ways: **collaboration**, **donations**, **sponsored research** (where you hire UGA to do the work for you), and **consulting** (where you hire individual faculty members or graduate students). The University welcomes all four kinds of support. Let us know if you have an idea for a project.

We also invite all industrial partners and associates to **come and visit us** and speak with groups of students. This is your "inside track" to recruiting.



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The AI Newsletter is published twice a year. For more information about the Institute's activities, e-mail [shbrooks@uga.edu](mailto:shbrooks@uga.edu) or look at [www.ai.uga.edu](http://www.ai.uga.edu). Thanks for your interest!