The University of Georgia

AI Newsletter

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

Spring 2009

25 Years of AI at Georgia

This summer marks the 25th anniversary of the University of Georgia's AI research group. In July 1984, Donald Nute, Michael Covington, and Terry Rankin set up shop in the basement of the Statistics building as part of a new research unit within UCNS (now EITS). The group's mission was to use supercomputers in AI, but their first AI workstation was decidedly non-super – an Apple II microcomputer with an auxiliary Z80 CPU card, running LPA Micro-Prolog. Soon, with NSF support, the group acquired LMI Lisp machines. Early research topics included defeasible reasoning and Prolog loop detection. By 1986 the master's degree program was up and running, and the rest is history.

Letter from the Director

Welcome to our new newsletter! And, for many of you, welcome to our new Industrial Partners and Associates Program (IPAP). Industrial Partners are those who assist us financially, and Industrial Associates are others who'd like to stay in touch. Members of both groups receive the newsletter and other current information about what's going on at the IAI. If you're not already a member and would like to join, please drop us a line (706-542-0358 or shbrooks@uga.edu).

The goal of the newsletter is to keep you informed of the major current events in the Institute. We'll be including news items such as changes within the Institute, faculty highlights, recent graduates and their research, and other happenings. We'll also let everyone know how we are doing in our relatively new role as an Institute within the Franklin College of Arts and Sciences at UGA. Except for the budget situation, everything is going very well so far.

As you know, the economic downturn has had a major impact on everyone in Georgia, and the University System is really feeling the pinch. Usually, during economic hard times, the demand for graduate education increases, especially in technology areas. We are beginning to see increased applications to the MSAI program. The bad news is that our budget has been cut so we are unable to support all the new students we would like. Your support of our program would help us compensate for the reduced budget caused by the downturn. If you'd like to help, let us know.

We're excited about the new newsletter, so please read on and let us know what you think about it.

–   Don Potter
Director
Institute for Artificial Intelligence

# News: **AI Center Upgraded to Institute**

On July 1, 2008, the Artificial Intelligence Center (established 1993) was upgraded to Institute status. It had already been operating as an Institute (granting degrees) for its entire history. This follows its move into the College of Arts and Sciences, from the computer center (EITS), two years earlier. The new logo of the Institute for Artificial Intelligence (IAI) was designed by graduate student Thomas Drapela.

News: **Potter Receives Teaching Award**

IAI director Don Potter received a General Sandy Beaver Special Teaching Award in 2008. These awards for excellence in teaching annually honor outstanding faculty in the Franklin College of Arts and Sciences who have shown a sustained commitment to high-quality instruction. The award honors a 1903 UGA alumnus who was president of Riverside Military Academy.

# Research Spotlight: **A Flying Robot (UAV)**

AI and CS graduate students are creating an autonomous Unmanned Aerial Vehicle (UAV) by adding robot intelligence to a commercial radio-controlled aircraft. Currently, the aircraft is simulated in MATLAB and Simulink and visualized with FlightGear, an open-source flight simulator (which currently displays a Cessna body even though the actual body is different).
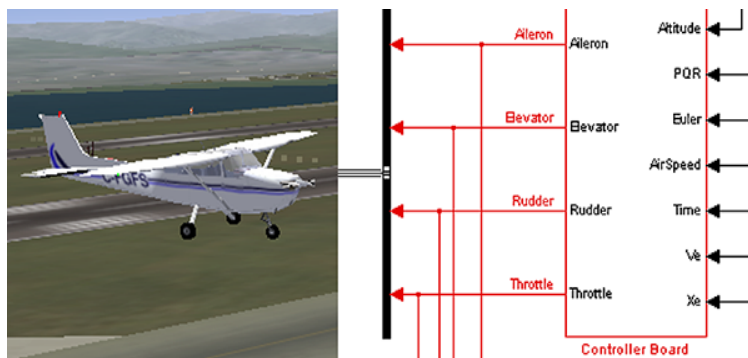
The researchers have created a special programming language, FLIPS, for specifying flight plans. Evolutionary computation and neural networks will enable the UAV to learn as it flies. The project is directed by Dr. Don Potter and includes Robert Eunice, Rahul Lakshmanan, Uthayasanker Thayasivam, Roi Ceren, Michael Durden, Swetha Pandithi, and Tom Drapela.

# Research Spotlight: **Neural Networks Predict Weather**

Artificial neural network models for air temperature and dewpoint temperature developed by our own Ron McClendon and Gerrit Hoogenboom are used on the web site www.GeorgiaWeather.net. Each model is run every five minutes, and temperature predictions for more than 75 stations are updated immediately. To see forecasts, click on any site on the map, then choose "Temperature Prediction."
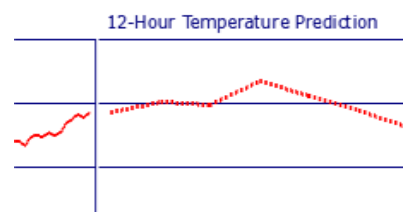
Research Spotlight: **How Densely Packed Are Your Ideas?**

When they speak or write, some people pack ideas together more densely than others. In 1996, *JAMA* reported that low idea density in young adulthood was a good predictor of Alzheimer's Disease 50 years later. At the time, idea density in people's writing or speech had to be measured manually, a tedious process.

UGA graduate students Cati Brown and Tony Snodgrass and faculty member Michael Covington have developed a software tool to measure idea density automatically. Known as CPIDR ("spider"), the program is available free from www.ai.uga.edu/caspr and is finding unexpected uses – for example, a search engine can use it to distinguish introductory material from technical treatises on the same subject.
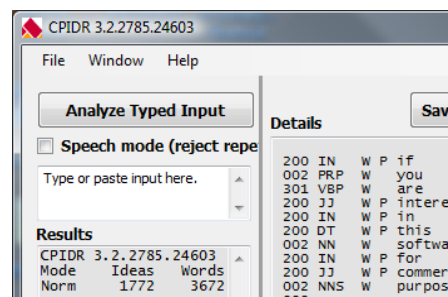
Recent Theses

All are for the M.S. in AI unless indicated. For a copy of any thesis, e-mail shbrooks@uga.edu.

Xia Qu, *The NED-2 Forest Ecosystem Management DSS: The Integration of Even-Aged Red Pine, Aspen, and Uneven-Aged Loblolly Pine Prescription Models* (advisors, D. Nute and W. D. Potter)

Kevin Crowell, *Precipitation Prediction using Artificial Neural Networks* (advisor, G. Hoogenboom)

Karan Sharma, *Towards Generally Intelligent Machines* (advisor, W. D. Potter)

Colin Nicholson, *Determining Whether a Text Changes in Subject* (advisor, M. Covington)

Jiayun Han, *Building an Efficient, Scalable, and Trainable Probability and Rule-Based Part-of-Speech Tagger of High Accuracy* (advisor, M. Covington)

Recent Publications and Presentations

This is a selected list; there are more. For copies of any publications, contact the authors or shbrooks@uga.edu.

Robotics and vision

Uchiyama, H., W.D. Potter, M.A. Covington, J. Tarver, and R. Eunice (2008). Perceptual navigation for semi-autonomous wheelchair operations. Invited book chapter in *Service Robot Applications*, I-Tech Education and Publishing KG, Vienna, Austria, Chapter #5, pp. 71—94.

Neural networks

Shank, D.B., R.W. McClendon, J.O. Paz, and G. Hoogenboom (2008). Ensemble artificial neural networks for prediction of dew point temperature. *Applied Artificial Intelligence* 22(6):523-542.

Ashish, D., G. Hoogenboom, and R.W. McClendon (2009). Land-use classification of mutispectral aerial images using artificial neural networks. *International Journal of Remote Sensing* (in press).

Machine learning

Qian, Bo, and Khaled Rasheed (2009). Foreign exchange market prediction with multiple classifiers. *Journal of Forecasting* (to appear)*.

Evolutionary computation (genetic algorithms)

Shi, Liang, and Khaled Rasheed (2008). ASAGA: an adaptive surrogate-assisted genetic algorithm. *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO 2008),* pp. 1049—1056.

Natural language processing and psycholinguistics

Brown, Cati; Snodgrass, Tony; Kemper, Susan J.; Herman, Ruth; and Covington, Michael A. (2008). Automatic measurement of propositional idea density from part-of-speech tagging. *Behavior Research Methods* 40(2):540-545.

Covington, Michael A.; Riedel, Wim J.; Brown, Cati; He, Congzhou; Morris, Eric; Weinstein, Sara; Semple, James; and Brown, John (2009). Ketamine and schizophrenic speech: more difference than originally reported. *Journal of Psychopharmacology* 23(1):111-112.

AI theory

Maier, F., and D. Nute (2009). Well-founded semantics for defeasible logic. Society for Exact Philosophy. University of Wyoming, May, 2009.

How to Sponsor Research

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

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, and you may have something we'd like to work on.

Sponsored research. You can contract with us through the University of Georgia Research Foundation (UGARF) to do research for your company. This is a major source of financial support for the IAI. *We are always looking for sponsored research.*

Donations. The most cost-effective way to support research, if you don't need confidentiality or a specific deliverable, is simply to make a gift to the IAI designated to support a particular research program. Unlike sponsored research, donations do not incur overhead charges. Donations are made through the Arch Foundation and are fully tax-deductible; contact us to make arrangements, or click on the "Support" button on www.ai.uga.edu.

Consulting. You can hire faculty members or advanced graduate students to work for you part-time as independent contractors. The University encourages this, within reasonable limits. It's a good way to do a small project with a high level of confidentiality, but the consultant works privately, and you don't get access to University facilities. Consulting projects often grow into sponsored research.

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