

# SIGNIFICANT BITS

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## HEAD'S REMARKS

by Prof. Micha Hofri

Dear Alumnae and Alumni:

Welcome to the Summer 2002 issue of Sigbits. The timing is unusual, as we wanted to remind you of the upcoming Homecoming 2002 Open House on Saturday, September 21st at 10 a.m. I hope to see you here then.

The past year has been, as usual, hectic, and one particular activity, which involves the alums of the department, is the preparation for the re-accreditation of our undergraduate program.

The department has been accredited since 1986. Unlike previous years, the accrediting agency evaluates us not by what we *do*, but, largely, by what we *achieve*. Hence, the department is now called upon to evaluate the effectiveness of its program, and a major source of information is you, our alums.

A particularly difficult, and hence, interesting, criterion of our program is how it stands the test of time, in this area which reinvents itself so frequently. I think the most important question is: Has our goal of preparing you for life-long learning been achieved, and how can we improve on it? You can tell us on September 21st!

This year we have seen changes in the office and faculty. Most of you would probably recognize none of the current office staff: see them on our web page.

This year we saw three new faculty members arrive: they describe themselves later on these pages. However, we

lost some too: Nabil Hachem converted his leave of absence to a resignation, to stay with Upromise; Mark Stevens joined Charles River Associates; Isabel Cruz moved to the University of Illinois in Chicago; and Gabor Sarkozy changed his status to 'affiliate faculty'.

We expect to continue recruiting in the coming year. We have now 22 full-time faculty members, 18 of them tenured or tenure-track. All this growth is the result of the CS department now having the largest number of students on this campus, nearly 25% of the total.

As a result, we have outgrown Fuller Labs. However, we hope to see our new building in the very near future. This program has been delayed for some time, due to difficulty in obtaining the needed funds, but we can now see the light.

Still, funds will be tight, and designated gifts and contributions could make a significant difference to the quality of the final product. If you, or your corporate entity, can consider a large donation towards the needs of the department, please get in touch with me (hofri@cs.wpi.edu).

I tell you all this not only to keep you abreast of the changes around us and to solicit your contributions, but also because we want you to continue to be a part of the growing community of the Computer Science Department at WPI. We want you to be proud of your alma mater, spread the word, and support us with the means to reach ever higher levels of excellence.

## FACULTY PROFILES

Please welcome...Emmanuel Agu

I joined WPI's CS Dept. as an Assistant Professor in the summer of 2002 after a one-semester visiting position at the University of Massachusetts at Amherst where I received a Ph.D. in Electrical and Computer Engineering in 2001. I also received an M.S. degree from the same department in 1996 and a B.S. degree in Electrical and Electronic Engineering in 1994 from the University of Benin in my home country, Nigeria.

My research interests are in areas of computer graphics concerned with using computers to produce realistic images.

Specifically, I am interested in how to represent interesting natural phenomena like diffraction, which produces the colors we observe when we look at a CD-ROM, and interference, which produces color in oil slicks and soap bubbles.

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I am also interested in an emerging area of computer graphics known as appearance models. This area tries to introduce effects like weathering of stones and aging of paint pigments to make computer graphics images even more realistic while reducing the almost plastic look of previous models.

In prior research, I worked on how to adapt computer network protocols to incorporate mobile computers. Initially, network protocols were designed to work with only computers that were not mobile. With the advent of mobile computers, it became necessary to re-examine the functionality of these protocols when some or all the computers in the network were mobile. My previous work pertained to the Media Access (MAC) and Application layers.

At WPI, I will teach the undergraduate computer graphics and computer networks classes as well as a graduate seminar in computer graphics.

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## FACULTY PROFILES

*Please welcome...Dan Dougherty*

After receiving my degree from the university of Maryland in 1982 I spent two years as a John Wesley Young Instructor at Dartmouth College, and then joined the faculty at Wesleyan University. I was at Wesleyan from 1984 till the present, most recently as Professor of Computer Science and Vice-Chair of the Department. I joined the Computer Science department at WPI in the summer of 2002.

Broadly speaking I am interested in logic in computer science. Logic has come to be called "the calculus of computer science," reflecting the fact that logic provides computer science with both a unifying foundational framework and a tool for modeling, playing a crucial role in diverse areas such as artificial intelligence, computational complexity, distributed computing, database systems, hardware design, programming languages, and software engineering.

My most recent research interest has been in programming languages and automated deduction and the interaction between these fields. In the former area the theme of my research is the investiga-

tion of formal systems inspired by programming practice with the aim of laying the groundwork for rigorous system design and implementation. The application areas range from automated deduction to functional and object-oriented programming to, most recently, communicating and mobile systems.

In automated deduction, much of my work has concerned unification, the problem of taking two patterns and asking whether they admit a common instance. This is a fundamental computational step in logic programming and theorem proving and also has applications in constraint-solving and computational linguistics.

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## FACULTY PROFILES

*Please welcome...Neil Heffernan*

After graduating from Amherst College summa cum laude, I went into Teach for America, a program that recruits 500 recent college graduates to teach in the inner city. I taught algebra and witnessed first hand the poor quality of educational software. After teaching for a few years I decided to get a Ph.D. doing research in building intelligent computer programs that can tutor students.

It's a challenge to build computer programs that are as good as humans at tutoring students. The best data available today indicates that existing educational software is remarkably less effective than experienced human tutors. My goal is to figure out how we can make more effective educational software. My technique is to build intelligent tutoring systems that attempt to model student thinking and respond in the same ways that experienced human tutors do.

For my Ph.D., I did research into the nature of mathematical cognition to figure out what was hard for students when writing expressions for algebra word problems. What was commonly thought of as difficult for students (i.e., comprehending algebra word problems) turned out to be relatively easy, and what was thought to be relatively easy (i.e., articulating the math used in a computation), turned out to be difficult. I built a running cognitive model that could be used to understand students' common errors. I

also studied the techniques of an experienced human tutor and built a computer model that implemented some of the techniques that she used, including her technique of asking probing questions rather than simply giving hints (as the state-of-the-art computer based tutors do). My system tutors hundreds of students a month at [www.AlgebraTutor.org](http://www.AlgebraTutor.org). Experimental studies comparing this tutor with a control system reveal that even though students do half the number of problems (because the dialogs take more time), students score higher on the post-test.

I have funding from the Office of Naval Research that supports making it easier to build intelligent tutoring systems. I also have funding from the Spencer Foundation and the National Academy of Education to compare intelligent tutoring systems to both one-on-one human tutoring as well as classroom instruction. Because I am interested in the general issue of doing a better job of evaluating systems using common metrics, I am the organizer of the Learning Open ([www.LearningOpen.org](http://www.LearningOpen.org)). I also have an interest in data-mining and machine learning.

I joined the faculty at WPI in the summer of 2002, and will be teaching classes in artificial intelligence as well as a course in building intelligent agents and cognitive modeling.

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## HOMEcomings

*CS Open House*

The department will be holding an open house during Homecoming this year. It will be held in Fuller Labs from 10-11:30 a.m. on Saturday 21st September. We hope to have a number of both old and new faculty there to talk to, we will provide tours on request, and will display some posters showing current research. We look forward to seeing you!

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## SABBATICALS

*KAL & EAR*

Both Prof. Karen Lemone and Prof. Elke Rundensteiner are taking sabbatical leaves this year. Karen is experiencing

Computer Science in different environments: namely Nepal and Iceland. Elke remains in New England to interact with local database experts, to establish new industrial collaborations, and to explore “continuous query systems”, a new research area.

## **TEACHING TEACHERS**

*to TeachScheme!*

This summer Kathi Fisler shifts from teaching students to teaching teachers.

In July, Prof. Fisler led a workshop on teaching introductory CS for high school and college CS, math and science teachers. The workshop, part of the TeachScheme! project, is a multi-university effort to improve introductory computing curricula.

The project began at Rice University in 1996. It arose from the observation that traditional introductory curricula neither taught solid design foundations nor engaged the students. In response to these concerns, the program founders created a new, design-oriented curriculum complete with textbook and programming environment.

As the founders saw increasing numbers of students starting college with weak computer science training, they decided to take their approach directly to high schools. The project provides free week-long summer workshops on the curriculum and its pedagogy for high-school teachers.

Fisler has been a TeachScheme! instructor since 1997. The workshops currently host 80 teachers a year from around the nation and the world. Teachers have responded enthusiastically; over 100 high school teachers have adopted the curriculum, as have several universities.

Fisler and her collaborator Shriram Krishnamurthi, a project founder and a CS professor at Brown University, started a local workshop in Providence last year. Each summer, they train between 25 and 40 teachers. Their colleagues currently run similar workshops at Northeastern University, the University of Utah, and Adelphi University.

The team currently has a three-year, 1.9 million-dollar grant from the National

Science Foundation to support the project. The funding supports development of the software and teaching materials, as well as the summer workshops; all materials, the software, and the workshops are free of charge to teachers. Supplementary funding from CORD helps sustain the free workshops, and WPI contributes graduate credits to teachers who complete the program. The team welcomes sponsorship from other institutions (contact <kfisler@cs.wpi.edu>).

## **VISUAL INTER LINGUA**

*Dr. Paul Leemans*

The Computer Science Department recently awarded its ninth Ph.D. degree to Paul Leemans. His advisor was Lee Becker.

On April 9th, 2001, Paul successfully defended his thesis in public before his Ph.D. committee, consisting of Profs. David Brown, Stanley Selkow, and Norman Wittels.

His thesis, “VIL: A Visual Inter Lingua”, is concerned with a computer-based iconic communication language, that allows people to communicate with each other when they share no common language. It allows a user to construct sentences, without actually having to type in words, i.e. solely relying on icons.

The goal is to make the system language independent so that it can be used universally. This should allow system users to be able to construct sentences irrespective of the languages known by the users.

Paul is a manager at KPMG CT in the Netherlands. Information about VIL and iconic communication languages can be found at <[www.cs.wpi.edu/~nemleem/](http://www.cs.wpi.edu/~nemleem/)>.

## **HETEROGENEOUS DATABASES**

*Dr. Andreas Koeller*

The CS Dept. recently awarded its tenth Ph.D. degree to Andreas Koeller. His advisor was Elke Rundensteiner.

Andreas successfully defended his thesis in public before his Ph.D. committee on December 14th, 2001. His committee consisted of WPI Profs. David Brown,

Nabil Hachem, and Carolina Ruiz, plus Prof. Gunter Saake from the University of Magdeburg. His thesis title is “Integration of Heterogeneous Databases: Discovery of Meta-Information and Maintenance of Schema-Restructuring Views”.

In today’s networked world, information is widely distributed across many independent databases in heterogeneous formats. Integrating such information is a difficult task, since database contents and structure change frequently, and users often have incomplete information about the databases they use.

Andreas investigated two fundamental problems in integration: How to discover the structure and contents of and interrelationships between unknown databases, and how to provide durable integration views over several such databases.

Andreas has accepted a faculty position at Montclair State University.

## **THE DOCTORS CLAYPOOL**

*Dr. Kajal Claypool*

The CS Dept. has awarded its eleventh Ph.D. degree to Kajal Claypool. Her advisor was Elke Rundensteiner.

Kajal successfully defended her thesis in public before her Ph.D. committee on May 28th, 2002. Her committee consisted of WPI Profs. George Heineman and Carolina Ruiz, plus Prof. Stan Zdonik, Brown University, RI, and Dr. Arnon Rosenthal, MITRE Corporation, Bedford, MA. Her thesis title is “Managing Change in a Heterogeneous Environment”.

Kajal is married to WPI CS Professor Mark Claypool. While the latter remains here, the new member of the Doctors Claypool is an Assistant Professor in the CS Dept. at UMass Lowell.

## **PROF. HEINEMAN TENURED**

*Promoted to Associate and Father*

Prof. George Heineman has been promoted from Assistant Professor to Associate Professor of Computer Science. George was appointed as Assistant Pro-



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fessor in 1996. He holds an M.S. and Ph.D. in CS from Columbia University.

His research interests are Software Engineering, component-based software, and object-oriented design. George coordinates the Software Engineering Research Group (SERG). His book "Component-based Software Engineering", co-edited with William T. Council, was published by Addison-Wesley in June 2001.

Prof. Heineman also had other good news recently: on Monday July 15th at 3:37 pm his son Nicholas George was born. He was 8 lbs. 7 oz. and 21 inches (Nicholas, not George). Mother, baby and father are doing very well.

**TA OF THE YEAR AWARD**

*Jae Won Chung*

A CS graduate student was honored at WPI's recent Faculty Honors Convocation. Jae Won Chung received WPI's 2001-2002 Teaching Assistant of the Year Award. This yearly award is determined by a committee that solicits nominations and opinions from all students and faculty.

Prof. Stephen Jaspersen, who presented the award, quoted a source as describing Jae as a person who "goes beyond, often way beyond, what is required".

Jae completed his CS M.S. degree in February 2000, and expects to complete his Ph.D. in May 2003.

**JOURNAL RESPONSIBILITIES**

*Wills & Brown*

Prof. Craig Wills has been appointed for a three year term as an Associate Editor of "ACM Transactions on Internet Technology".

This is a new journal, first published in August 2001. It provides multi-disciplinary coverage of the new application technologies, social issues and public policies which are shaping Internet development.

Prof. David Brown has been appointed as Editor in Chief of the Cambridge University Press journal "AIEDAM: Artificial Intelligence for Engineering Design, Analysis and Manufacturing".

Brown is the third Editor since the journal started in 1986. He has been on the editorial board since it started, and is well known for his research in AI in Design.

**BITS OF NEWS**

*Alumni and others*

Joseph Soetens '75, passed away last year. He taught CS courses during the 1980's, and retired in 1992 — James West '87 was struck and killed by lightning recently, while on vacation. He worked at Bose Corp., and lived in N. Grafton — Weddings: Lily Lau, Stuart Wells, and Carla Caputo — Leslie S. Pearson, a consultant in New York City, is now Leslie S. Gottlieb after her wed-

ding last year — Jeff McConnell has a new book, "Analysis of Algorithms: An Active Learning Approach" — Chris Wraight is director of North American marketing at Sophos, Inc. — Kirk Jalbert, who teaches photography at Clark University, had a recent show entitled "Urban Remains".

**ALUMNI**

*Let us hear from you!*

We want to hear from CS alumni. We'll try to include selected information in the newsletter. Contact us via email or real mail. Please let us know any changes to your address as soon as possible, so that we can keep you informed about the department. Let us know your web home page URL too. We'd like to add pointers from our pages to yours.

**CONTACTS**

*How to reach us...*

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