THE BROWN INTERNET COMPUTING LAB

Overview

Steve Reiss

With the support of a new $640,000 two-year grant from the National Science Foundation, the Computer Science Department is developing an innovative laboratory for undergraduate and graduate education and research into Internet-related problems. The lab will ensure that our research and our students address issues of both immediate and long-term relevance as we move to an Internet-based world.

The Proposed Laboratory

The Internet has changed the face of computer science. Concepts such as e-commerce, grid computing, peer-to-peer programming, and file sharing provide new directions. Old problems, such as security and authentication, have become more complex and at the same time more important. Other problems, such as cooperative work, databases, and distributed systems, have changed scale so dramatically that one now must talk, say, of millions of concurrent users.

It is difficult to study or teach this new face of computer science using old tools and environments. Many of the complexities and problems occur only when tackled at "Internet scale", that is, when there are thousands of simultaneous users, millions of potential users, widely distributed systems, multiple servers, unreliable networks, and strong security and privacy concerns, hackers, and the like. Modern research must be driven by and shown to work in the real world on tomorrow's problems. Moreover, students can encounter and appreciate the difficulties inherent in modern Internet-based systems only by working with real systems.

Our new laboratory for experimenting with Internet-scale applications will be suitable for both state-of-the-art research and instruction. For research, it will provide a framework in which ideas can be tested at Internet scale. Such a laboratory will give researchers insights into what the real problems are and how they might be addressed, and will also allow them to validate new approaches. For teaching, the laboratory will show students the problems that arise and techniques used when building applications at Internet scales and will let us offer courses that better prepare students for real-world programming and research.

This laboratory will use a flexible combination of high-end servers, large data storage, cluster machines, workstations, network infrastructure, and appropriate software. The center of the configuration will be servers capable of running Internet-scale applications that will run commer-

> *Modern research must be driven by and shown to work in the real world on tomorrow's problems*

cial web software, a commercial-scale database system, and load generation and analysis software. The data storage will support this application and provide a large web snapshot for teaching and research involving accessing and understanding the structure of the web. A laboratory-based front end of 20 workstations will provide class and researcher access.
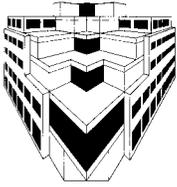
The laboratory will be used in a variety of research projects. Pervasive programming involves building a common programming framework for dealing with web services, peer-to-peer computing, and grid computing in an open-source environment. Aurora*[1] tackles the problems of large-scale network and stream-based data management. Language research addresses the semantics of web applications. Covalent objects provide a means for object sharing at Internet scales. Prooflets are a simple and efficient way to authenticate large numbers of small data items across the web. Web modeling will look at statistical models of the web and

model of this cluster is 20 dual-processor 64-bit machines. We want this cluster to be upgradable to a 40-node cluster during the second year.

- *Networking Gear.* We need sufficient number of gigabit switches to connect the above machines in a local network.

- *Network Storage.* The lab will need an additional 5Tb of disk space that would be accessible by the above servers.

- *Software.* We would like to obtain appropriate commercial Internet application and e-commerce software so that we can expose our students to the tools and techniques that are used to build real web applications. This would include suites such as SunOne or WebSphere, environments for building Internet applications, database systems, load-generation tools, etc.

This equipment will be used to set up the initial laboratory. During the second year, we plan to expand the laboratory by obtaining the following:

- *Cluster Upgrade.* The small cluster obtained during the first year should be upgraded to 40 dual-processor machines during the second year. These machines should match the ones in the small cluster obtained during the first year.

- *Cluster Server.* We want a third rack-based cluster server with an additional 40 dual processor machines. This will give us a total of 120 machines that can be used for experiments involving peer-to-peer or grid computing applications. This cluster should consist of dual-processor, 64-bit machines with at least 4G of memory per unit.

- *Network Upgrade.* We will need additional switches for the above machines. In addition, we will want to provide appropriate hardware and/or software for simulating the network performance (packet loss, jitter, etc.) seen by an Internet application.

- *Storage Upgrade.* We would like to add an additional 5Tb of disk space to the laboratory either by expanding the disk space obtained during the first year or by obtaining a second disk unit.

- *Specialized Hardware.* We are interested in experimenting with various types of specialized hardware including (but not limited to) firewalls, encryption, load balancers, and XML processors.

Internet Lab Configuration
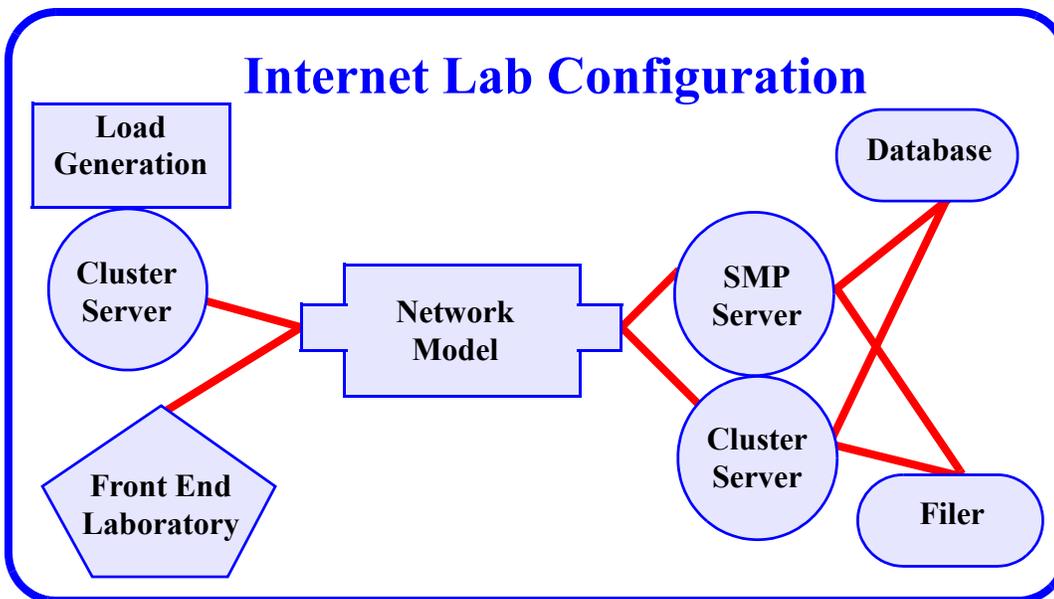
The lab can be used for studying a typical web service by using one of the clusters to generate load and then using either a cluster server or multiple SMP servers to host the application

their application to search, data mining, annotation, and crawling. In addition, we will use the facility as a laboratory in both undergraduate and graduate courses.

Configuration

The laboratory will have a flexible configuration similar to that shown above. It will need:

- *An SMP Server.* This should be a 64-bit, multiprocessor machine with significant memory. We are interested in having at least eight processors and 16Gb of memory.

- *Cluster Server.* This should be a rack-mounted cluster of machines. Our initial model of such a cluster would consist of 40 dual-processor machines, each with at least 2G of memory.

- *Load Generator.* This should also be a rack-mounted cluster of machines that we want to use initially for load generation. Our initial

1. The Aurora Project was featured as the lead article in the fall 2002 issue of *conduit!*, V11, N2.
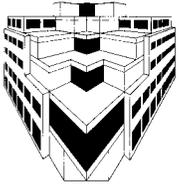
Collaboration

Today it is industry that is developing Internet-scale applications and discovering their many inherent characteristics and difficulties. We want to have access to those problems so that we can develop appropriate solutions and approaches that will scale into the future. We also want to educate students, both undergraduate and graduate, to understand the problems and approaches so that they can work effectively with tomorrow's systems.

We have sent out a call for industrial partners to work with us to identify problems, help direct our laboratory's configuration and uses, and provide us with discounted or donated hardware and software. We are interested in partnerships in which both parties are committed to working together to address these important and necessary Internet-related issues.

The Internet laboratory is being designed as a collaborative effort. Some possible examples of what we would like to see industry provide include:

- Speakers who would come and present technical talks on Internet-related software issues.

- Visiting researchers who would spend time at Brown using the laboratory and working with the faculty and students.

- Sharing current and future problems involving Internet applications. We are interested in getting a better understanding of what problems the computer industry and their customers need to have solved in the next year, five years, and ten years with respect to Internet-related software.

- Access to research tools for understanding and exploring Internet applications.

- Additional support for specific Internet-related research projects at Brown. This would include both financial support and collaborations between Brown researchers and industrial researchers.

- The opportunity for researchers at Brown, either faculty or students, to visit and possibly work with researchers at industrial locations.

In addition, we are looking for ways that Brown can contribute to such collaborations that are of interest to industry. Possible examples here include:

- Providing students, either graduates or interns, who have a detailed knowledge of specific Internet-related hardware and software.

- Providing speakers to present technical talks on Internet-related software issues.

- Providing access to the Internet laboratory to industry or its customers for research purposes.

Visitors to the department over the summer will have noticed the gradual flowering on our walls of a very impressive group of art works. It's the brainchild of Franco Preparata, whose connections with Brown's art world enabled us to receive on loan a collection of the graphic works of Walter Feldman, long-time Brown Professor of Visual Arts, and his students.

Franco and Eli Upfal selected these prints from a huge collection in Prof. Feldman's office; as Eli remarked, "The pictures you like are Franco's taste, I'm responsible for the rest." Franco not only arranged this loan but also shepherded all the artworks through the framing process (with help from his assistant Fran Palazzo), by no means a trivial task. This handsome collection has made our institutional greige walls much more interesting and aesthetically pleasing.

Professor Feldman came to the department on October 17 for a reception in his honor to thank him for his generosity. In this image, Chairman Eli Upfal is to Professor Feldman's left and Franco Preparata to his right. The handsome print behind them is entitled "Homage to Little Bird" and was created by Feldman for his mother.
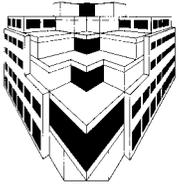
- Providing access to the Internet laboratory for customer or in-house training.
- Providing specific services using the Internet laboratory such as beta-testing software.
- Providing independent feedback on the quality or performance of software or hardware configurations.

Space for the new Internet Lab will become available this coming January. We are currently actively looking for potential industrial partners and collaborators, and are in the process of specifying the actual equipment for the lab. We expect the lab to be used both for courses and for research in the spring semester.

ACL AFTER-DINNER SPEECH

Mark Johnson

The Association for Computational Linguistics (ACL) is the primary professional association for natural-language understanding and processing. It is a tradition at the banquet of the annual general meeting that the Association's President entertains the members with a humorous after-dinner speech. The President of the Association is **Mark Johnson, Professor of Cognitive and Linguistic Sciences and Computer Science at Brown,** and he has agreed to let us print below his after-dinner speech at the Association's banquet last July in Sapporo, Japan.

Friends, colleagues,

As many of you know, the ACL president uses the dinner speech at the banquet to pass on insights about the ACL and our field in a light-hearted and amusing way. Traditionally what happens is that the speaker tries to say something entertaining but winds up being facetious, embarrassing himself or herself and offending half the audience. Well, I've been told that Japan is a country in which traditions are very important, so I'll do my best to keep this one up!

Instead of restricting my attention to just the ACL or even computational linguistics, I'm going to talk about something that affects virtually everyone on the planet who's not living in a cave, and point out an opportunity we, as computational lin-

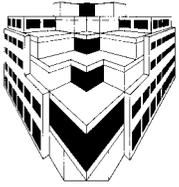guists, have to do something to really make a difference.

I speak of course about the deep crisis that afflicts us all: a crisis of ethics. Now you may not be aware of any ethical crisis, but just open any newspaper and you'll see that scarcely a day goes by without a new scandal or cover-up in all levels and spheres of society: corporate, government, science, and most distressingly, even home decoration!

In the corporate arena, consider the scandals faced by Arthur Andersen and Enron, to name just a couple. Whom can you trust when the people paid to check the books are cooking them too? What kind of world are we living in when corporate executives would put at risk the state of California's electric power just to make a few measly bucks?

Even the honored fields of science and engineering are not above suspicion. The funding agencies are trying to force us researchers and our students to become more ethical in how we do research and train our students. The U.S. National Science Foundation requires classes in ethics for all graduate students in NSF training programs. And the National Institutes of Health have gone one step further—recognizing that the rot goes deeper, they require that not just the students but we faculty as well pass an ethics tests in order to get NIH grant money.

But what really shook me up was learning that the ethical rot had spread as far as that paragon of good taste, that epitome of thoughtful planning and organization, Martha Stewart. I'm sure most of you are familiar with the wonderful contributions Martha has made to the world of interior decoration, party planning and home cooking. It's hard to think of anyone who has done more to eliminate clashing patterns and colors in table settings, all the while encouraging innovative yet tasteful dinner menus that can literally be thrown together by anyone with a month or two to spare. So I'm sure you share my sense of dismay when she was accused of insider trading on the stock exchange, selling ImClone shares on the basis of an illegal stock tip. I mean, what sort of world are we living in if the person you rely on for advice for your intimate dinner-party etiquette is at the same time cheating you on stock trades?

What the general membership may not know is that the ACL executive committee has been considering appointing Martha to our committee to

help improve the appearance of our publications and generally jazz up our Proceedings. Yes, we're thinking of making Martha the ACL Chief Cover Design, Size and Color Coordinator.

You know the problem. Members who have been to more than one or two of our conferences wind up with a stack of Proceedings on their bookshelves. Up to now the size, shape and color of Proceedings' covers have been chosen by the local conference organizers, which leads to the confusing cacophony of sizes, colors and even numbers of volumes on our bookshelves. Unlike the Proceedings of our competitor organizations, which have a pleasing harmony and color scheme that you can recognize at a glance, there's so much variation in ACL Proceedings that you can't even always identify them as ACL Proceedings. The Proceedings of the COLING conference in Nantes were photo-reduced to virtually paperback-book size. The print was so small that we should have distributed magnifying glasses with it, like the OED.

I imagine Martha's first suggestion will be to standardize the size of Proceedings; she'll probably tell us to stick with Proceedings that are uniformly large. She will probably suggest that larger Proceedings convey the sense of solidity and reliability we want for our field, as well as being too big for your colleagues to sneak off with in their jacket pockets (Martha's practical about this sort of thing). I expect she will think it's good for us to alternate between US- and metric-sized paper in our Proceedings to reflect the richness and diversity of our field and make it easier for our color-blind members to figure out where one year's Proceedings end and the next one begins.

But the place I think Martha will be able to help us most is with a color scheme for our Proceedings' covers. Her first suggestion will almost certainly be that we switch to pastel colors, of course, but my guess is that she'll suggest that we try to pick colors that reflect the content of the Proceedings while harmonizing with the colors of our other Proceedings up there on the shelf. For example, theoretically oriented conferences would be cool, clear, ice blue, workshops with hot-breaking new results on the latest new technology could be fire-engine red (created with a special dye designed to fade rapidly over time), and those surprise-language conferences sponsored by security agencies that dare not speak their name would be in invisible ink on transparent clear plastic paper. Our general conferences, of course, would continue to be a generic neutral beige.

I'm sure you're as excited by these possibilities for innovative new cover design as I am, so it is with a sad heart that I have to report that Martha is unlikely to be able to actually take up her appointment on the ACL executive committee; I've heard that she's devoting all of her time to her legal defense. I guess I should have seen this coming: it should have been a dead giveaway when the ACL executive committee's emails to her were returned not with suggestions about doilies on the front covers, but with spam offering us ImClone shares at a steep discount. I only hope that not too many members of the ACL executive committee spent their hard-earned money buying these shares—you really could have lost your shirt on these!

The ethical plight of Martha and others like her who have suffered from temporary ethical lapses has affected me deeply. I spent many a sleepless night wondering if there was something we computational linguists could do to help her and the millions like her avoid the ethical pitfalls that abound in modern-day life.

Now the traditional response to these ethical crises has been to pass laws and regulations and generally exhort people to behave ethically. For example, the U.S. Congress has passed a number of laws to reform the financing of political campaigns, with the general goal of ensuring that in
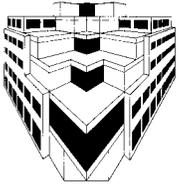
the future politicians will not be influenced by money. Well, all I can say is that you might as well pass a law forcing rivers to run uphill. Some of you will no doubt point out that none of this is news: people have been lamenting a drop in morals and ethics for hundreds of years, and none of the laws or regulations have really had any effect. Well, I would say, after two hundred years of falling ethics, how low must we be by now! And isn't it time that we did something about it?

Now I'm sure that the more practical among you must be thinking, as I am: we've tried all the human-oriented systemic solutions, and they've all failed; surely there must be a technological quick fix for this problem? This is where I think we computational linguists can make a contribution. Notice that most unethical behavior involves language in some way: a letter to the accountants asking them to deduct a holiday home as a business expense, an email from an Arthur Andersen consultant suggesting a corporate tax dodge in the Caribbean or, in Martha's case, a phone call from a stock broker suggesting she dump her ImClone shares before tomorrow morning's company news report.
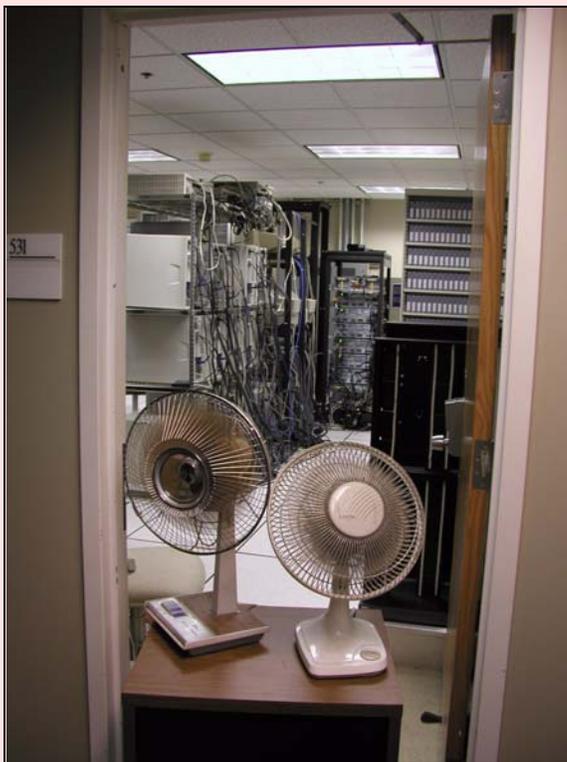
A low-tech solution to a high-tech problem–when the AC failed during a stretch of particularly hot, humid weather this summer, fans were commandeered and pressed into service to prevent a machine room meltdown

This is our great opportunity. We've been looking for a killer app for computational linguistics, and I think this is it!

Computational ethics would be about detecting, classifying and ultimately correcting unethical behavior. Think how useful a little "ethics checker and corrector" program integrated into a word processor could be! It might work something like this. The executive at Enron who first dreamt up the idea of scalping electricity in California probably sent a memo to the boss that went something like this: "By artificially restricting electric-generating capacity during peak summer hours we can drive electricity prices sky-high and make a fortune". Well, the ethics checker program would flag this, perhaps with a cute little icon of a cloven-hoofed chap with a pitchfork, and bring up a window saying "This passage contains one or more unethical statements. Suggested replacement: 'By building more electric-generating capacity in developing countries, we can raise living standards in the third world'".

Well, maybe the design needs a little fine tuning, and I agree some people might wonder about the appropriateness of your word-processor dispensing ethical advice, but I think you get the picture. I envisage ethics agents in spreadsheet programs to catch shady accounting tricks, and in email systems to detect and reroute unethical messages. For example, someone sending me a business plan involving siphoning money from a certain Nigerian petroleum-exporting corporation might receive an automatic reply along the following lines: "Dear Ms. Mbuto Seke-seke, I am Mr. Johnson's electronic ethics agent. Mr. Johnson does not engage in this kind of unethical business transaction. I have detected four illegal business practices in your message, and have forwarded it to the State Attorney General for prosecution. Have a nice day!"

Computational ethics seems to have great possibilities, with something in it for all of us. Dialog modeling and speaker intention tracking is obviously involved in distinguishing ethical and unethical behavior in conversations. Speech researchers might focus on the phonetic and prosodic correlates of lying, detecting those subtle pitch changes indicating that the speaker is trying to put one over on you. There are plenty of speech applications too. Voice-enabled ethical agents have applications in mobile cellular phones—that, say, cut off a conversation by simulating a radio-dead zone whenever the speaker is about to say something ethically dubious or compromised. There are even theoretically interesting philosophical questions: ontologists, for example, could write papers on the nature and number of different types of unethical behavior, and how they should be incorporated into the Wordnet hierarchy.

But perhaps the most innovative applications of computational ethics involve wearable, pervasive
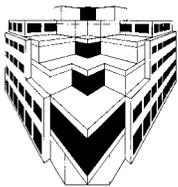
computing. Wearable computers have been talked about for some time; I'm sure you've all heard about "smart" fibers and fabrics that weave a computer into your shirt or even your pyjamas. More recently some of us have been talking about pervasive computing, whereby a computer sticks with you all the time and records every word you utter during your life. Well, it seems to me that while the technology is there or will be in a few years, what they lack is motivation for actually doing any of these things. I'm not so sure it's a good idea to have a record of every inane thing I've said over the years. For example, I knew that the comment I made on that panel last year was ridiculous within ten seconds of saying it; the last thing I need is a computer continually reminding me of that fact.

Now ethics checking and correction is an ideal application for wearable pervasive computers. Imagine a device that could give you a subtle warning that you're getting into ethically dubious territory and that you should shut up before you do anything to incriminate yourself—how much pain and anguish that would save!

So I'm sorry to report that the pet industry has scooped us here and we'll be playing catchup for the next few years. I'm thinking of devices like the Invisible Fence: a radio-controlled dog collar that automatically administers a series of increasingly painful but harmless electric shocks whenever the dog tries to cross a preset physical boundary. Clearly this is the way to build ethics correctors! We can design wearable ethics correctors along the same lines as the Invisible Fence, although in this case the boundary would be ethical rather physical. In any case, inspired by this and other electronic pet restraints, I envisage a whole range of ethically enabled chokers, chalices and other high-fashion accessories.

Of course, I'm sure there are some spoilers among you who are going to point out that ethics checking and correction is a hard problem, probably AI-complete, and that we really don't have the faintest idea how to detect, let alone correct, unethical actions and statements.

Well, yes, but since when has that stopped us? All this shows is the necessity of large amounts of funding from the appropriate government agencies. And is the situation really any different from that in machine-translation, question-answering or dialog systems? We've been promising to solve

these problems in the next five years for almost half a century. In fact, the one thing I can see that distinguishes computational ethics from these established areas of computational linguistics is that if we ever did get it to work, it might well classify as unethical the very research proposals we used to get funding!

And of course it's possible that actual understanding really isn't necessary for computational ethics at all. I'm not sure exactly what empiricist ethics would be—would it study the kinds of ethics that people actually have, or, in the context of ethics instruction, would it give a sinister new meaning to the term "supervised training"? But clearly empirical ethics is a topic whose time has come.
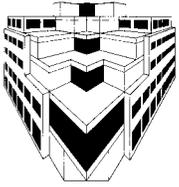
When I was planning this speech, I really didn't want to give a talk with no solid data in it, but actually writing code or doing any experiments seemed too much like hard work. So I did what any good empiricist would do—I used Google. The question here is: can we use corpora to automatically identify unethical behavior? For example, can we somehow discover that it is unethical to cheat on your income taxes by using corpus data alone? Who needs intelligence when you've got a terabyte or two of data?

Well, Google reports 2,360 hits for the query "ethical cheat income taxes", but only 795 for the query "unethical cheat income taxes", which gives an odds of 4:1 in favor of cheating on income taxes. (The nitpickers amongst you will be pleased to know that all the statistics reported in this paper are significant at p less than 10^{-4}!). Interestingly, you get the same sort of results for the query "scalp electricity in California" (odds of 8:1 in favor), and "dodge tax in Bahamas" (5:1 odds in favor). The actual hit counts go up if you replace the words "ethical" and "unethical" in the query with the words "good" and "bad", but otherwise the results stay pretty much the same.

What does this mean? While I don't expect Web citizens to be perfect, I had hoped that on average they would at least lean the right way! But perhaps the ethics of dodging taxes in Bermuda and making super-profits by reselling electricity in California is a little subtle for the highly caffeinated hackers who put the Web together, so I decided to look at a couple of ethically less complicated cases. I'm disappointed to report that even "beating your children" and "murder your in-laws" come out with odds of 5.5 in favor!

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My goodness, what sort of world are we living in! Do 5.5 times more people really think it is OK to wallop the kids and knock off granny if they happen to get in the way? And more importantly for us science types, is there hope that we can get this to work well enough for a research grant proposal? Is empiricist ethics doomed to track the ever-lowering ethical standards of society at large? Or is there some kind of hack we can use to get the kind of normative judgments we know the goody-goodies in the funding agencies will require? Inspired by the immortal words of Benjamin Disraeli and Mark Twain about "lies, damned lies and statistics", I pressed on.

The first thing to note is that the Web seems to be populated by cheery, perpetually upbeat people — silly fools—who use the word "ethical" some 3,700,000 times, which is 3,100,000 times more often than they use "unethical". The same sort of thing holds for "good" and "bad". Well, clearly the Web is unfairly biased towards nice, happy, ethical terms and doesn't reflect how bad things really are. Can we correct for this unrealistically positive view of the world somehow?

Now bear with me through a little statistical mumbojumbo so we can get the sort of results we want. We can correct for the over-optimistic bias by asking not just whether dodging taxes is ethical (according to Google, the majority of documents seem to suggest it is), but asking instead whether dodging taxes is any less ethical than the myriad of other ethically dubious things that people on the Web talk about. And when we do this, viola! we get the results we want! I won't bore you with the details, but if you calculate the log odds ratios for all of the searches I mentioned earlier they all come out negative, which is appropriate since negative values set the right sort of moralistic tone when we're talking about corporate tax havens, scalping electricity and beating children. Even "murdering your in-laws" turns out to be ethically negative, which is just as well for everyone in the audience with married children.

I certainly don't offer this as the final word in empirical ethics, but just to show the kinds of possibilities there are out there and the kinds of mischief you can get up to with Google and a bottle of red wine. So, I propose to you that next time you're looking for a project, consider computational ethics. We can do this in five years! Think of how it would help the world; the right little program could have pointed out to the Enron executives that scalping energy in California was unethical, and it should have warned Martha to stick to interior decorating. The time has come to ask not what Martha can do for us, but what we can do for Martha. And if anyone is interested in a very special deal on some ImClone shares, see me after the talk. Thank you and good night.

# THE 31ST IPP SYMPOSIUM MOBILE & PERVASIVE COMPUTING

Recent years have witnessed a strong trend towards mobile and pervasive computing, in which large numbers of casually accessible, mobile or embedded computing devices are connected by an increasingly ubiquitous networking infrastructure. The confluence of increasingly small and powerful computing devices and ubiquitous wireless and wired connectivity is radically changing the way we live, work, and play. Middleware systems and technologies that make possible and drive mobile and pervasive computing were the topic of our 31st IPP symposium on May 6, 2003. The symposium brought together speakers from Fidelity, Hewlett-Packard, IBM, Intel, Invensys/Foxboro, and Sun Microsystems.

Host Ugur Cetintemel

I inaugurated the symposium with an overview talk that attempted to lay out the groundwork for the rest of the day by focusing on the past, present, and anticipated future advances in hardware and software technologies that make possible mobile and pervasive computing. I also talked about related research projects we are currently undertaking in the department.

Up next was our first guest speaker: **Archan Misra of IBM Watson**. Archan talked about recent research in distributed middleware for data composition from pervasive data sources. Archan identified decentralization, scalability, and adaptivity as the key design considerations for next-generation distributed middleware. He described work by him and his colleagues on Context-Sphere/CLASH, an adaptive middleware infrastructure that enables a large base of servers to be used as a shared computing resource for supporting large-scale pervasive services and applications.

Phillip Gibbons of Intel Research addressed applications involving a large number of Internet-connected rich sensor units (such as web cameras and microphones). Phillip presented the IrisNet system, which strives to provide a generic infrastructure to ease the development of sensor-enriched Internet services. IrisNet facilitates
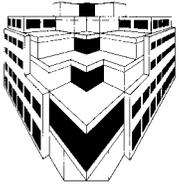
Symposium speakers, clockwise from top left:
Ugur Cetintemel, Brown; Archan Misra, IBM Watson; Phillip Gibbons, Intel
Research; Hesh Kagan, Invensys/Foxboro; Aad van Moorsel, Hewlett-Packard
Labs; Brad Hampson, Fidelity Investments; Jim Waldo, Sun Microsystems

scalable distributed query processing at the granularity of individual sensor units, an ability commonly demanded by many sensor-driven applications. Phillip also showed us a videotaped demo of the IrisNet prototype running a mock parking-space finder service, which would no doubt be extremely popular here on the Brown campus.

The morning session was concluded by **Aad Van Moorsel of Hewlett-Packard**, who discussed the scale and complexity challenges in developing computational utility grids for pervasive applications. The goal is to make computational resources as easily accessible and usable as traditional utilities such as water and electricity (e.g., "I can just plug my CPU-free terminal in the CPU jack and run my Mathematica, regardless of where I am"). Aad finished his talk by arguing the necessity of using standardized web-services-based middleware in order to ease the job of IT administrators and to make pervasive applications more manageable.

Jim Waldo of Sun Microsystems started the afternoon session with an engrossing and amusing talk that identified some key middleware challenges in pervasive computing. Jim argued that next-generation pervasive applications would require a level of reliability and adaptability that current software systems cannot achieve. According to Jim, it makes more sense to try to build systems that can deal with failures than to try to build parts that don't fail. Jim also made the case for systems that can evolve continually as changes

happen ("change the fan belt while the car is running"), no matter how drastic the changes are ("change the engine while the car is running").

The last two talks addressed the impact of pervasive computing on two different applications domains. **Brad Hampson of Fidelity Investments** spoke about "Natural Broker", a voice-driven query interface to a financial information system that provides basic statistics about publicly traded stocks. The motivation for developing Natural Broker was to make wireless PDA-based financial applications easier to use. Brad talked about the technical problems his group had faced while developing Natural Broker and concluded his entertaining talk by pointing out that customer demand for wireless query interfaces was still unclear.

Finally, **Hesh Kagan of Invensys/Foxboro** characterized the effects of pervasive computing on industrial process automation. Invensys/Foxboro, one of the leaders here, is very much concerned with providing real-time monitoring and control of their systems. After an eye-opening introduction to the world of process automation, where evidently even the small process lines have huge numbers of embedded control units, Hesh discussed future plans to use wireless sensor networks for non-obtrusive monitoring of process lines.
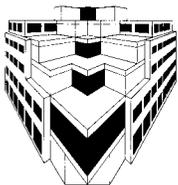
DON BLAHETA, PhD '04

Quoth Fran Palazzo: "Hope you are doing well, Suzi is asking me for info about recent grads. Please let me know what you are doing. Thanks." I started writing a simple response, and it sort of morphed into a conduit-style chatty update. Not sure if that's what you were looking for, and if not, feel free to edit it accordingly, but I figured I might as well leave it as is. :)

What am I doing? Enjoying myself! I'm an Assistant Professor of Computer Science at Knox College in Galesburg, IL. This term I'm just teaching intro; it's in Java, but I've been recycling some of the stuff I helped write for CS17, lo these many years ago. (Just today I handed out the third project—Eliza!) Next term I'll teach another section of intro, plus an NLP class, and beyond that, who knows what the future holds? I'm one of just three CS profs here, so I'll get a chance to teach a lot of different classes. Not much research so far, but as I settle in I'm finding more time for things other than class prep, so hopefully soon I'll be able to get back to that.

Those who followed my extracurricular activities at Brown will be totally unsurprised to hear that I'm trying to get a ballroom dance club going here. I've been teaching a class every Sunday and I have a small group of regulars (both fac/staff and students) that, hopefully, will grow as people tell their friends. Only time will tell.

Outside Knox, I think I'm becoming known around town primarily as "that guy who drives the cute car" — I just bought a blue and white Mini Cooper, the only one in Galesburg, and quite a few people have been commenting on it.

Anyway, I'd love to hear from other Brown folks; my email here is *dblaheta@knox.edu*.

ADI GANZ, ScB/ScM '03

As a member of the University's top-level administrative staff (VP Research), Andy van Dam received the following email message from Russell Carey, VP and Secretary of the University:

Each year, as many of you are aware, we ask one undergraduate student in each degree category to be the symbolic degree recipient in the ceremony on the Main Green. Adi Ganz is the sole recipient this year of the combined ScB/ScM degree. Quite unexpectedly, in his reply to this request he wrote a paragraph that I thought captured quite nicely what we hope the undergraduate experience will be for students. I thought his perspective on his Brown education might be of interest to you, so I am forwarding it, with his permission.

Dear Mr. Carey,

It is an honor to accept your offer.

Brown has left a positive permanent impact on my personality and academics. It allowed me not only the gratifying opportunity to pursue a combined ScB/ScM degree, but also the opportunity to help fellow students through various channels, most notably my six teaching assistantships in Computer Science and Biology, and to incorporate education in the life sciences into my computer science curriculum. This allowed me to pursue my dream of applying to MD/PhD programs and become a medical scientist. If there is any way in which I can help you or the President to further strengthen the message that students have a vast potential for multifaceted growth at Brown, please let me know.

Sincerely, Adi

GIDEON MANN, '99 and BROCK PYTLIK, '03

This picture of Brock and me, Gideon Mann, was taken in our office at Johns Hopkins. We are both Ph.D. students of David Yarowsky in the Center for Speech and Language Processing. When Brock came this fall, he reminded me how excellent the Brown Computer Science Department is and how much I enjoyed being there. Please give my fond regards to the faculty, staff and all of the unredeemable goofballs from '99.
gsm@cs.jhu.edu

Gideon Mann (l) and Brock Pytlik
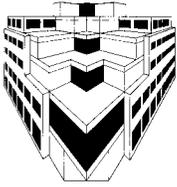
GAIL MITCHELL, PhD '93

Hi Eugene: I've been meaning to send a note to you ever since reading your 'unplugged' article [about the creator of the smiley :-)] in the spring issue of *conduit!* to let you know that I don't know Heidi Fox, but I'm currently managing a project for which Ray Tomlinson (the @-sign guy) is the Chief Architect. His office is three doors away (a corner, of course. I at least have a window). I often notice news photographer types around interviewing from all over the world. I guess his recent IEEE Internet Award prompted at least one of those.

When I brought up the *conduit!* citation ;-) in our weekly management meeting, the PI of the same project, Bruce Robert, mentioned that he knows you (if I'm remembering correctly).

Hope all is well with you. I guess you may have seen my youngest wandering around the office this week :-). He much prefers Brown to BBN as a place to spend a day.
Gail

SCOTT RAPOSA, ScB '94

About two years ago I had just left my position at a dot-com called iHarvest in Silicon Valley. I had lived in California for almost four years and really gotten into the lifestyle, but something was telling me I needed to get away from it all—from the high expenses, from the hi-tech atmosphere, from the corporate world, from everything I'd grown accustomed to. So I did what any sane person would do—I quit my job, sold just about everything I owned (including my beloved Miata which I still miss dearly), packed all my stuff into a friend's SUV, and moved to the backwoods of southern Oregon.

However, my Oregon experience ended. Quickly. I decided in about three weeks that I had to get away, far away: the specific circumstances combined with a house full of leaks, dogs, rats, bats, and several unnamed woodland creatures, weeks of ceaseless rain and 40-degree weather made my decision clear. Now, not having a car, a job, much money, or any clue whatsoever about anything really, I decided to camp out with my brother for a month. And why not, seeing that he was in Florence, Italy? Needless to say, my stay in Italy more than made up for my "discomfort" in Oregon. There are some great (and somewhat bizarre) pictures of the trip here on my brother's site:
*http://www.robertraposa.com/giornale/gennaio_02.htm*

http://www.robertraposa.com/giornale/febbraio_02.htm

My next destination was my a-bit-too-rural-for-my-own-tastes-but-hey-you-gotta-take-what-you-can-get hometown of Rockaway, NJ. I'll say this for Rockaway: the deer are real friendly. I even managed to pet one. And my parents are great hosts and great cooks, so you won't catch me complaining. The best part of my stay in Rockaway was that I could afford to stay unemployed for 18 soul-searching months. But while yes, it was great to have 18 months away from the grind, it's not something I'd recommend to the faint of heart. For me, at least, not having a job meant not having a purpose or an identity and therefore having to come face-to-face with all kinds of things I didn't want to know about.

Fortunately, I found my way out of the depression by discarding the job listings for all the jobs I didn't want in the first place and focusing on my only source of inspiration at the time: my keyboard (music workstation/synthesizer/expensive-toy-that-makes-cool-music). (Actually, buying that keyboard, a Korg Karma, was one of the reasons I didn't have much money left.) So I decided to use my investment wisely by learning it inside and out. I began composing on it and programming it and became active on an online forum dedicated to the keyboard. After a few months, I decided I would sell my work—a set of new sounds designed specifically for the Karma keyboard. Shortly thereafter, I contacted the guy who developed the technology that runs the keyboard to see if he wanted to collaborate.

Fast forward a few months: my product, called Reincarnation (get it? Karma? Reincarnation? Oh well, I liked it) was co-produced and marketed by Stephen Kay, the inventor of the Karma technology, and I began working for his company, Karma Lab (which is now just the two of us) to develop the core music technology further. Reincarnation
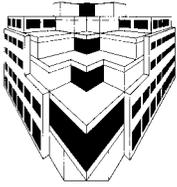
goes for $50 and is selling well, and the Reincarnation web page (*http://www.karma-lab.com/sounds/rein1.html*) has some nice user reviews. Unfortunately, there aren't any online demos to listen to (yet), and you can't do anything with my product unless you have a $1500 keyboard to go with it; but you can still take a peek if you're interested.

So these days I spend four days a week working from my studio in my new home in Montclair, NJ. I share two floors of a huge Victorian house with my housemate Kris and her two cats. We each have two bedrooms to ourselves, our own bathroom, and our own living room. We share the kitchen and a small "meditation room" (yes, she's into all that stuff too). I've been performing on my keyboard and plan to do a lot more of that soon. For about eight months, I played in a small band every Sunday morning at a spiritual center. It wasn't your average Sunday service music as this group likes to get up and dance! I also played background music during the meditation which taught me a lot about how to create a musical atmosphere without distracting the listener. Now, I'm starting to play more chill-house, ambient groove stuff at cafes and parties and such, a dream of mine for the last few years.

I'll end by saying that I'm living a life now that I never, ever, ever in a million years could have imagined just a short time ago. For one thing, I live in NJ! (OK: it's really not that bad after all. I fought it for a long time, but Montclair is cool and I'm only 12 miles from NYC. I truly miss the mountains, but hey, easy access to real pizza and real bagels nearly makes up for the loss.) But seriously, at least a few times a week I experience something amazing—like finding an incredible place to live in just one phone call, or being offered an antique bedroom set worth thousands of dollars for only $100. Call them miracles, call them whatever, but I know they aren't about luck. My expectations for what I'll get out of life are extremely high, and getting higher each day. And these expectations are being reflected in my experience. It's been quite a ride to get here, but I've been blessed with some amazing spiritual teachers (who knew they were on the east coast too?!) and friends. Bottom line: things are good.

With much peace, joy, happiness, love, and all things good. Scott
sraposa@alumni.brown.edu

MARK STERN, ScM '91

(Steve Reiss's wife Loretta, ScM '81, who became interested in issues concerning communication with deaf people in the course of her doctoral

Mark with his 1979 Piper Archer, the "Kitty Hawk," enjoying fall foliage in New Hampshire this October

*work, knew Mark Stern while he was at Brown and recently noticed his name in an article about deaf pilots in the August/September issue of **NADmag** a publication of the National Association of the Deaf. She passed it along to Suzi Howe, who made contact with Mark.)*

I've enjoyed reading *conduit!* over the last several years, so here's my turn. After getting my ScM in Computer Science at Brown, I worked in the Macintosh Human Interface Group at Apple for five years. I joined Netscape in 1996 as a senior designer for their browser, and then managed design teams for Netscape's server products and *Netscape.com*. I continued with the company after the merger with AOL as Director of Product Design for AOL's Web Properties. During these years, I pursued my dream of learning to fly, acquired a small plane, and in 1999 flew it through all the lower 48 States. You can read my chronicles of this aeronautical journey at *www.flight48.com*. Last year, after 20 years of living and working in Silicon Valley, I "retired" from the computer industry and took some time off to move back to the East Coast and to hike in New Zealand. Now, in a new career, I am fixing up old houses in the upper Connecticut river valley (near Dartmouth).
Mark Stern, White River Junction, VT.

DILIP D'SOUZA, ScM '84

*In the fall 2002 issue of **conduit!**, Dilip's book, **The Narmada Dammed: An Inquiry into the Politics of Development** was highlighted in the 'changelog' column. He wrote to let us know about a PBS production about the Narmada dam.*

Much of what's in this documentary is what I wrote my second book, ***The Narmada Dammed***, about. It was shot in many of the same places that I travelled in, some at more or less the same time.
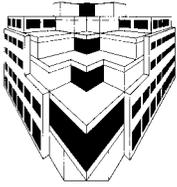
I saw a slightly different version of it here a couple of weeks ago, and Franny Armstrong was there to discuss it with the audience. Worth seeing if you get a chance: a good intro to the issue.
dilip@alumni.brown.edu

Suzi Howe forwarded Dilip's email to the faculty and **John Hughes** *was moved to reflect upon a similar situation:*

One of my kids' favorite books a few years ago was about the building of the central-MA Quabbin reservoir that provides water for Boston. It's called **Letting Swift River Go**. It ends with the protagonist, now a grown woman but a child at the time of the damming, out rowing on the reservoir with her Dad on a summer evening. He's pointing out where various things used to be, and she writes:

> I leaned over the side of the boat and caught the starry water in my cupped hands. For a moment I remembered the wind through the willow, the trains whistling on Rabbit Run, the crossroads where I had met Georgie Warren and Nancy Vaughn. Gone, all gone, under the waters. Then I heard my mother's voice coming to me over the drowned years. "You have to let them go, Sally Jane." I looked down into the darkening deep, smiled, and did.

It's interesting that we have something in our very backyard that is rather similar to what Dilip has been looking at and writing about. One interesting lesson is that the effect of such a flooding lasted (in this case) only about a generation and a half.

By the way, the drawings are by Barbara Cooney, who seems to me to be the best kids-book illustrator around, now that Robert McCloskey is dead.

INTERACTIVE VICON-BASED DEMO

User Interface/3D Graphic Research Scientist Andy Forsberg

Last summer, collaborators from Los Alamos National Lab (LANL) visited the Graphics Group to experience recent work done at Brown firsthand. One demonstration was a virtual painting program in which you could put virtual ink on a physical wall by touching the wall with your index finger. When and where to display ink was determined by the 3D tracking system and software algorithms.

Michael Black and Bill Warren purchased the Vicon camera-based tracking system for computer vision projects and action and perception experiments in their one-of-a-kind motion-capture facility. LANL recently installed this same tracking system in their Cave and work done

for this demo will be used to exchange Cave software in the future. David Erickson (CS ScB, '04) and Jonathan Bankard (CS/Econ. ScB, '05) worked at Brown over the summer to support projects that used the Vicon system and another camera-based system.

This "toy" painting application helped us better understand both how to use the Vicon system for interactive applications, and the accuracy and latency of the system.

David Erickson's finger and hand movements are tracked as he "paints" on a wall in the Moonlab. Three markers are tracked by the motion-capture system and movement is interpreted by the painting application

Jonathan Bankard and David take a break from technical work to exercise their brains' right sides
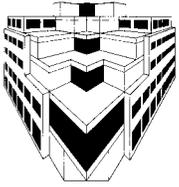
Biking enthusiasts Shriram Krishnamurthi and Mark Dieterich co-organized some great rides on the East Bay bike path over the summer. Students, staff and faculty participated in the 20-mile rides.The start of one is pictured below — Michael Black caught up with them later...

Said Shriram, "We took the photo at Del's because it was unimpeachable evidence that we had indeed ridden at least ten miles each way!"
l to r: Hulya Yalcon, Shriram, David Laidlaw, Tomer Moscovich, Guillaume Marceau, Liz Marai, Thomas Hofmann, Peter Sibley, Mark Dieterich and Michael Black.

fac.activities@cs.brown.edu

MICHAEL BLACK. For Michael, it was a summer of speaking in far-flung locations where he dipped his feet in the water from Acapulco to Sweden. In Acapulco, he gave an invited talk on "Inferring 3D People from 2D Images" at the 19th Conference on Uncertainty in Artificial Intelligence. On an island in Stockholm's archipelago, he gave a talk on "People from Pictures: Past, Present, and Future." He also gave an invited talk on "Bayesian Decoding of Motor Cortical Activity" at a Bayesian Statistics Workshop at Carnegie Mellon University, but somehow avoided dipping his feet into the Monongahela River.

UGUR CETINTEMEL. In the spring, Ugur was a panelist in the plenary panel session (entitled "Middleware for Distributed Sensor Networks") of the International Conference on Distributed Computing Systems 2003, which was held in Providence in May. During the summer, Ugur served on the program committees of the International Conference on Data Engineering 2003 and Data Engineering for Wireless and Mobile Access 2003. Ugur was also involved in the organization of the Workshop on Internet Applications 2003.

TOM DEAN. Tom has been appointed deputy provost at Brown and consequently has been supremely busy.

DAVID DURAND. David's research activity has been very light, as his non-Brown commitments have been high. He gave a talk "Trees Considered Unnecessary: Event-based Regular Transformations for XML" at the E-Biosci/Oriel Annual workshop (*http://www.e-biosci.org/sept/programme.htm*). He has continued to work on the Text Encloding Initiative (*http://www.tei-c.org/*) as a work group member and member of the TEI council. Perhaps most exciting is that he will be teaching the Document Engineering course again in the department this spring. Said he, "It was great fun last year, and should be even better this year."

AMY GREENWALD. Ella Greenwald Boyan was born at 12:50 a.m. on June 2nd at the Alternative Birthing Center in Woman and Infants Hospital. (Yes, that's right, the ABC: i.e., without meds!) She went home at 12:50 p.m. that same day, and she and her family spent a blissful afternoon in the backyard of their new home right here in Providence.

Ella's first month was restful. But by two months, she was already meeting with Brown's TAC team, helping them design their entrant "Botticelli" in the International Trading Agent Competition. She decided against going to the competition at IJCAI in Acapulco (too many mosquitoes), and sent two proxies instead: Mike Benisch, representing Botticelli, and Jesse Funaro, representing Brown's
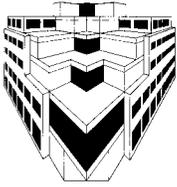
Classic entry, RoxyBot. Both agents were finalists in their respective competitions.

By the end of August, however, Ella was ready for conferences. She and her family flew down to Washington, D.C., where her mom gave two talks: one at ICML, on reinforcement learning and correlated equilibrium, and a second invited talk at COLT, on a general class of no-regret learning algorithms and game-theoretic equilibria. Between talks, Ella escaped to Virginia to rally for Howard Dean on his "Sleepless Summer Tour." Being a doctor, Howard refused a kiss from Ella, but he did agree to pose for a photograph.

MAURICE HERLIHY. Maurice's paper on wait-free synchronization won the 2003 Edsger W. Dijkstra Prize in Distributed Computing. "Herlihy's paper has been extremely influential in shaping the theory of distributed computing."

JOHN HUGHES. Spike is on sabbatical in Grenoble, France— "More mountains, less sailing. Lots of hot weather and good cheese. Then I turned around and came back to San Diego for SIGGRAPH a week later. But now I'm back in Grenoble, puzzling over questions like "What's the French word for 'french doors'?""

SHRIRAM KRISHNAMURTHI. Shriram had a fun spring and summer working with a very talented group of PhD and undergraduate students. The two latest (under)graduates, Brock Pytlik and Colin Blundell, are off to Johns Hopkins and Penn, respectively. Shriram also graduated his first PhD (co-advised) in the spring, now at a naval research lab. He served on the program committees for Component-Based Software Engineering and Automated Software Engineering. He helped boost the economy by buying a new bicycle, which he's bumped, banged and dented while already putting on several hundred miles. The stuffed animal menagerie in his office has expanded to welcome an emu and various marine fauna. He also acquired a Napoleon hat in Mainz, just before Fastnacht.
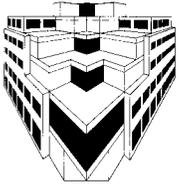
JOHN SAVAGE. John gave an invited address "Computing with Electronic Nanotechnolo-gies"at the 5th Italian Conference on Algorithms and Complexity in Rome at the end of May. At the end of June he completed his service as a faculty officer during an important time in the history of Brown. In May the Task Force on Faculty Governance, of which he was Chair, voted itself out of existence after completely overhauling Brown's faculty committee structure in about a year, the most extensive revision in faculty governance since 1969. During the last academic year John also served on the new Academic Priorities Committee, introduced by the Task Force, to bring senior faculty members together with senior academic administrators to set priorities and recommend the allocation of resources such as the 100 new faculty positions recommended by the President and authorized by the Corporation.

ROBERTO TAMASSIA. Roberto was awarded a prestigious NSF Information Technology Grant for a $2M project entitled "Context-Aware Computing with Applications to Public Health Management" in collaboration with researchers at the University of Illinois at Chicago (UIC) and at Northwestern University. This project is led by former postdoc Isabel Cruz, now Associate Professor at UIC. Roberto also received an NSF grant on his project "An Algorithmic Approach to Cyber-Security" in collaboration with Michael Goodrich (University of California, Irvine) and is a co-PI on another recently awarded NSF grant, the "Brown Internet Computing Laboratory" project led by Steve Reiss. In the summer, Roberto started a research collaboration with Seth Proctor at Sun Microsystems on an information security project that involves PhD student Danfeng Yao. Sun has provided a research gift in support of this project. In September, Roberto gave an invited plenary lecture on Authenticated Data Structures at the European Symposium on Algorithms in Budapest. This talk includes recent results developed with his PhD student Nikos Triandopoulos. Roberto's widely adopted textbook on **Data Structures and Algorithms in Java** (coauthored by Michael Goodrich) is now in its third edition. A forthcoming Korean transla-

tion is the latest of a growing list of international editions.

<center>◆</center>

ELI UPFAL. Eli was the organizer of RAN-DOM GRAALS 2003, (Random Graphs and Randomized Algorithms) in Bertinoro, Italy. He was on the program committee for the 10th Colloquium on Structurual Information and Communication Complexity (SIROCCO 2003) in Umea, Sweden. He was also on the program committee for the Second International Workshop on Experimental and Efficient Algorithms, in Ascona, Switzerland.

PASCAL VAN HENTENRYCK. In August, Pascal traveled to a conference in Acapulco to finish a paper with Aris Anagnostopoulos and Russell Bent, drawing some inspiration from the scenic bay and the pool (they also presented some papers at the conference). In September, Pascal traveled to Ireland with Cora Borradaile and Russell to finish another set of papers, drawing inspiration from the scenic coast and long runs on hilly roads. The flight crew at Cork had a fight before takeoff, making the trip back that much more exciting.

<center>◆</center>

SHRIRAM UNTETHERED (and nearly unhinged)

Shriram Krishnamurthi

The sender's name was in all-upper-case, and the subject line read, "Not exactly...".

Spam.

But I'm glad I opened it anyway. "This is not exactly your normal query...", the message body began. It was from an upstanding citizen at the NASA Johnson Space Center, asking for... the Export Control Classification Number (ECCN) for DrScheme, a Scheme programming environment I helped develop.

The what for what?!?

It transpires that a tasteful astronaut (name withheld to protect the innocent) had loaded DrScheme on his laptop for use during his free time in space. He was (a) going to be on the International Space Station (ISS) and (b) launching a hard drive image from Russia. The ISS is a multinational enterprise and Russia is, well, another country, so the act of sending software in both instances involves an export. Both, consequently, need an ECCN. (I wonder if there is some tacit assumption here that outer space, or at least the ISS, is a foreign land. I wonder if there isn't some group squirreled away trying to determine the equivalent of nautical limits in space.)

The US government does a remarkably good job of publishing documents on the Web; anyone who's had to deal with the IRS or the lucky few who've had to contend with the INS will grudgingly admit this. These are sometimes no more than OCR-scanned copies, but the scanning yields enough clarity that Google can find the documents. I can't begin to imagine what this process

must have been like ten years ago. (Probably a lot simpler: I'd have written off for an official document, then returned to my regularly scheduled work.)

Anyway, accessing prose is not the same as understanding it. The second paragraph of the first document I read began "The CCL is contained in Supplement No. 1 to part 774 of the EAR."

It was going to be that kind of day.

I have some layman's thoughts about such prose. It doesn't look like natural language at all. I conjecture it's because natural language is rife with anaphoric references. Letting context and a rich language of reference "do the talking" leads to higher communication bandwidth, but it's hell on disjointed documents.... But this is beginning to read like one of Eugene's articles, so I should stop this digression now.

The ECCN system is quite simple once you get the hang of it. Numerous artifacts, from nuclear to software, are given codes such as 14D993. These codes determine the range of permitted distribution and the licensing demands on those who wish to acquire them. Everything else is assigned the default code EAR99, sometimes designated NLR (No License Required). So it's simply a matter of reading enough documentation, slotting your product, and finding a code. This is a bit like saying that feeding your pet octopus is simply a matter of pulling aside the arms, placing the food in the middle, then retracting your limb. Easily done, but you may lose an organ or two getting the hang of it.

Reading these documents was not without its rewards. I discovered, for instance, that EAR 740.13 (d) (3) (ii) (A) differs from EAR 774 Supplement No. 2 (2) (a), though they describe the same thing. The former document is dated later, yet leaves out a key provision included in the latter, the recognition that software may be sold electronically! Better still, I found that ECCN category 14D993 specifically restricts the export of "program" proof and validation "software" using mathematical and analytical techniques and designed or
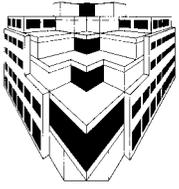
modified for "programs" having more than 500,000 "source code" instructions. Beware, all you verification researchers—don't get too ambitious!

Having done my research, I determined that we fall under License Exception TSU (Technology and Software — Unrestricted), though it all gets a bit sketchy here because our software is not specifically *sold*. (The concept of free software doesn't seem to be in the ECCN vocabulary. Cheap political crack omitted here.) This didn't necessarily mean we were EAR99, and EAR99 is an ECCN, whereas TSU isn't, and NASA had asked for an ECCN. Mustering great courage, I called the encouragingly named Outeach and Educational Services Division of the US Commerce Department. After only a few minutes, I was connected to a gruff counselor.

"Can I help you?"

"Ah, yes, I was hoping to get a quick clarification on an ECCN classification."

(gruffer still) "Yes?"

(deep breath) "If I find that my product falls under License Exception TSU under part 774 of the EAR, can I assume it has the ECCN of EAR99?"

I believe I did this without inhaling.

These are the moments that test the mettle of great men. Like Major Major's father, my counselor was made of stern stuff. He paused for just a moment, just long enough to accord respect to someone he clearly perceived to be a fellow numbers-and-policy wonk. And then, in a voice rich in cameraderie, he said, "You know, I've been trying to determine that for five years myself!"

Being excepted from a license was not the same as not requiring a license? In the logic of the US government, did the Law of the Excluded Middle not apply? What was the difference between the two?

Syria.

No, seriously. The difference really is Syria. TSU permits export to Syria, but EAR99 does not.

My counselor told me this with glee. Apparently I had hit on one of his favorite trivia questions, because, now really warming to the topic, he informed me that he had asked this very question of many of his colleagues. Some had incorrectly identified the two; others, quicker on the draw, had said that they were indeed different but had recommended the use of ECCN 4D994. As everyone knows — shucks, by this point even I knew — this was a contemptible response, because 4D994 permits the export of only *specific* software products. And so on.

Anyway, this story has a happy ending. We appear to meet EAR99. NASA Johnson has acknowledged receipt of our ECCN. I've been in touch with the fine astronaut. DrScheme will soon be happily beta-v-cs-reducing expressions in outer space.

Where has your programming language been today?

CHARNIAK UNPLUGGED

Eugene Charniak

In response to my piece in the last 'unplugged' about my student Sharon Caraballo, who had her PhD rubber chicken mounted by a taxidermist (see next page), I got the following delightful letter from another of my PhD students, Jim Hendler.

Eugene - I was thrilled to see the mention of rubber chickens in the Conduit. I am pleased this tradition continues, and I don't know if you are aware of it, but one of your students, to wit, me, was the very first recipient of a Brown PhD Rubber Chicken! The story may not be well known, so I share it with you here.

As you may recall, the tradition in our department once upon a time was that the defense was mainly a formality — the presentation was given, a few simple questions were asked, and then back to the department for the party.

For my defense, however, you invited Dave Waltz, a well-known AI scientist, as an outside reader. After my presentation, Dave asked a couple of really hard questions. Motivated by his example, Peter Wegner and John Savage decided to show they too could ask hard questions, and thus I spent about 45 minutes in the hot seat while questions were asked as to the value of the work, the novelty of the contribution, and other such FAQs in a PhD defense (although not often at Brown prior to this).

When I got back to the department, I was grabbed by a few of the more interesting graduate students and taken downstairs to one of the grad offices, where a rubber chicken had been living that year (for a reason none of us can remember). The bird was presented to me by Robert "Bobbo" McCartney and a couple of others with the admonition that they had never
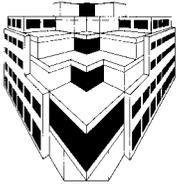
heard such "chicken-(expletive-deleted) questions" and that I deserved this rubber chicken for putting up with it. And thus was a tradition born...

By the way, this much-travelled rubber chicken is still proudly displayed in my office at the University of Maryland. It has started to deteriorate after 17 years, and I've been worried about how to preserve it — thanks for the tip about taxidermy!

p.s. I cc Suzi in case you all feel this is interesting enough for a Conduit letter, if not, at least share it with Trina and others who might enjoy knowing where the tradition originated.

p.p.s. The other souvenir of my defense, also still in my office, is the meat cleaver discussed in my thesis. Let's be glad that that wasn't the tradition that got started there...

Professor James Hendler, PhD '86
hendler@cs.umd.edu

Franco Preparata designed and created this beautiful leaded glass corner window piece for Jennet Kirschenbaum. After seeing an old-fashioned iris from her garden, Franco offered to make a stained glass version. They're pictured outside Jennet's office, where it attracts many compliments and is enjoyed by all passersby

I should note that in subsequent email Jim mentioned that the PhD student after him got a rubber turkey, but could not remember who that was. I mention this because it comes up in later detective work.

At any rate, I found this very interesting because it conflicts with a version that I published in 'unplugged' a few years ago, to wit:

The conferring of the rubber chicken (which is thrown at, not handed to, the successful candidate) goes back to 1985 or so when, after a particularly bad invited talk, one graduate student commented to another that someone should have shut the speaker up by throwing a chicken or some such at him. It turned out that the person suggesting this was due to defend his Ph.D. thesis a few weeks later, and several of the graduate students thought that during the defense they would throw a chicken, or at least a rubber chicken, at him. They chickened out (so to speak) and threw it only after the talk, but a tradition had started.
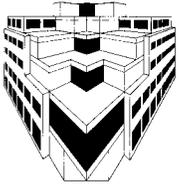
The dates correspond, (Jim's CV lists his PhD as May 1986, but he could have actually finished up in 1985) but there are a lot of differences between the two versions. I asked Jim about this but got as response a dignified silence. I sent email to Robert McCartney, who plays an important role in Jim's narrative. In response I received Robert's recollections, plus what must be the original document that I read before creating my earlier history. Written by Tom Freeman, another of our early grad students, it not only sides with my version but also contains a lot of the same phrases, which I must have read and unconsciously parroted (e.g., "particularly bad .. talk"). (Trina Avery comments that "Now you know how classicists spend their time", and she should know, she R-ABD one.) Tom's version does have a bit more detail that agrees with Jim's recollections. In particular, it seems that the first two rubber fowl purchased were one chicken and one turkey. Tom also comments, "I recall the salesman at the joke shop pointing out, with particular pride, the authenticity of the chicken: it had a "hickey" on the side of its neck, which is present in properly killed chickens." Robert McCartney adds that the two versions are compatible, since Tom's concentrates on the actions leading up to the purchase of the chicken and Jim's on what happened thereafter. Also, it seems plausible to Robert that it was Jim who was awarded the first rubber chicken. He thinks Mark Post (PhD '85), also a student then, may have received the turkey. Robert's (almost) final line was "PS—is this how religions start?"

Robert's actual final comment came in a subsequent email in response to my thank-you note,

Michael Benjamin	2002	Post-doc at MIT's Dept. of Ocean Engineering and AI Lab. He is developing AI techniques for autonomous navigation of unmanned marine vehicles in joint work with the Navy in Newport, RI
Stina Bridgeman	2002	Assistant Professor, CS, Colgate University
Steve Dollins	2002	Steve's setting up an investment advisory business to manage stock portfolios. He hopes to be up and running by early next year
Anthony Fang	2003	Assistant Professor, CS, National University of Singapore
Sam Heath	2003	Working for McKinsey and Co. in Toronto, doing management and strategy consulting for a variety of large companies, including,biotech, telecom, and (since this is Canada) natural resources
Kee Eung Kim	2001	Working for Samsung SDS Co., Ltd. in Seoul, Korea
James Kurien	2003	Researcher at Palo Alto Research Center, developing AI techniques for control of complex machines
Luis Ortiz	2002	Post-doc at the University of Pennsylvania
Gopal Pandurangan	2002	Assistant Professor, CS, Purdue University
Leonid Peshkin	2002	Post-doc research fellow at CSAIL, MIT's Computer Science and AI Lab, working under Leslie Kaelbling's guidance once again. His work involves some student supervision and research into computer vision and text understanding, stressing the learning aspect of intelligence as opposed to engineering intelligent behaviors
Bill Smart	2002	Assistant Professor, CS, Washington University, St. Louis
Srikanta Tirthapura	2003	Assistant Professor, Electrical and Computer Engineering, Iowa State University

which read: "Thanks! I now know more about rubber chickens than I ever thought possible. I think the last five brain cells I will ever create have been dedicated to the topic." I found his comment touching, particularly since it comes from the ever-cynical Robert McCartney:

Subject: RE: Rubber Chickens
From: Robert McCartney
<robert@engr.uconn.edu>
To: Eugene Charniak <ec@cs.brown.edu>
Cc: Robert McCartney
<robert@engr.uconn.edu>

eugene--

one more cell's worth: the most important fact about the rubber chicken tradition is that these are given to graduates by their fellow students--not the department, not

the advisor, not the university, not even the former mayor of providence.

this was true from the start (as was the case with jim), and is perhaps the most appealing aspect of the tradition.

cheers, r.

Moving on to other topics, just after the last *conduit!* came out, our chair, Eli Upfal sent out an email with a very odd spelling error. The only person to notice it, however, was Shriram Krishnamurthi, and as the email was otherwise run of the mill, I did not save Eli's original. However, I sure noticed Shriram's response:

Eli, while no-one would begrudge you your spell-checked emails, you should consider what the spell-checker is doing to your signature. Shriram
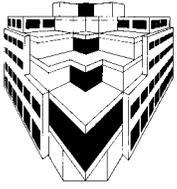
Eli Upfal wrote:

Please vote for faculty committees. Tomorrow is the deadline - some of our faculty are on the ballots. You don't need to vote for all categories if you don't know the people.

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I asked Shriram why he spent time reading the fluff at the bottom of emails. He said that he doesn't but that the fact that the "|"s in the signature no longer lined up caught his eye.

At any rate, this reminded me of a talk that former faculty member Dan Lopresti gave here many years ago with the catchy title, "The computerless office." His idea was that paper is the world's most convenient storage medium, and we should make it more compatible with computers. In particular, since these days most, if not all, paper documents are produced by computers, there is no reason why they could not include some extra coded information that would help an optical character recognition system reacquire the printed information. As one experiment Dan forced his OCR system always to produce actual English words. He scanned in the first page of **Moby Dick** and got the immortal first line: "Call me fishmeal."

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conduit!

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the **conduit!** team salutes the department's 25th anniversary. l to r: Jeff Coady, Suzi Howe, Eugene Charniak, Trina Avery

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Address changes welcomed