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## Information Technology at NYU



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# F a l l 2 0 0 3 E d i t i o n

Browse the table of contents, or select an option from this menu:

## Table of Contents

Select an article below, or click here to [download a print-friendly PDF of the entire Fall 2003 issue](#) (1.8MB PDF), or of [this page only](#) (227K PDF). Please note: PDF files require Adobe Acrobat Reader. Click here to [download a free copy](#) from the Adobe website.



Current Issue



Archives



About Connect

### NYUHome & E-mail

#### The New NYUHome: Improving Community & Communication

By Gary Chapman & Jodi Goldberg

NYUHome, the University's web portal to a wide range of services and resources, was upgraded to version 4.0 in August 2003. Two major features of the new release reflect both the promise and the challenge of the Internet today..

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#### Take Back Your Inbox! How to Customize Your E-mail Filters

By Eduardo DeLeón

Recent versions of many e-mail programs include a function that performs automatic junk mail ("spam") filtering, saving you time and grief...

[Read Article Online](#) | [Download PDF](#)

### Computing in the Arts

### IT Research Resources

#### Gartner Research Now Available at NYU

By ITS Administrative Computing Services

With more than 20 years of experience identifying and analyzing the trends and technologies that have shaped the course of business, Gartner, Inc. provides research and advisory services to over 11,000 organizations worldwide, including NYU's Information Technology Services...

[Read Article Online](#) | [Download PDF](#)

### Instructional Technology

#### A Taste of New Instructional Technologies Available at the ITS Multimedia Lab

By Robyn Berland

With the implementation of OS X on the Apple Macintosh platform in the ITS Multimedia Lab and the ITS hands-on classrooms, new and improved instructional software applications have been added to our software suite...

[Read Article Online](#) | [Download PDF](#)

#### ITS and NYU Libraries Orientation for New Faculty

### ArtBots: The Robot Talent Show

By Philip Galanter

On July 12 and 13, 2003, the second annual international *ArtBots: The Robot Talent Show* took place at EYEBEAM Gallery in New York City...

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### Close Encounters: Performance Art, Politics & Technology

By Kate Monahan

This past July, NYU hosted *Encuentro 2003, Spectacles of Religiosities*, a ten-day event organized by the Hemispheric Institute of Performance and Politics. The Institute is a consortium of institutions, artists, activists, and scholars from across the Americas...

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### Wireless Computing

#### The NYURoam Wireless Network: It's Where You're Going!

By Carlo Cernivani

You've probably seen them, those people sitting in Starbuck's, sipping a double latté and browsing the Internet on their laptop computers. What makes this kind of mobility possible is wireless data networking...

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### Humanities Computing

#### Publishing XML Files on the Web

By Matthew Zimmerman

The Humanities Computing Group within ITS' Academic Computing Services is working with the FAS Department of History on a web-based publication project, *The Public Writings of Margaret Sanger*...

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### NYU Libraries

By Kate Monahan

To help raise awareness of the many services available to NYU faculty, ITS and NYU Libraries recently co-hosted an information session for incoming instructors...

[Read Article Online](#) | [Download PDF](#)

### What's New in NYU Blackboard?

By Ethan Ehrenberg

This fall, Information Technology Services (ITS) upgraded the NYU Blackboard system to version 6.0...

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### Computer Security Corner

#### Tips on Securing Your Windows Computer in Insecure Times

By Tracey Losco

It seems as though every time you turn on the radio or television these days you hear about a new computer worm or virus...

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### Social Sciences, Statistics & Mapping

#### Mapping for Social Change

By René Poitevin

Mapping for Social Change, a new course in NYU's Gallatin School of Individualized Study, brings together public participation GIS, service learning, and community organizing...

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#### Friday GIS Clinics

By Frank LoPresti

This past spring, ITS Academic Computing Services' Social Sciences, Statistics, and Mapping Group started offering a Geographic Information Systems (GIS) Clinic on Fridays...

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#### Exploring GIS: A Student's Experience

By Benita Liao

My introduction to Geographical Information Systems (GIS) began this past July, when I started working...on a study of the transmission of HIV/AIDS in Cameroon...

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#### A Primer for Panel Data Analysis

### **NYU Libraries' New Website Unveiled**

By Tom McNulty & Nadaleen Tempelman-Kluit

NYU Libraries launched its newly redesigned website this fall. The new website is more user friendly and offers a variety of enhancements...

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### **RedLightGreen Begins Pilot Phase at NYU**

By Dylan Tweney

This fall, NYU is participating in the pilot phase of the RedLightGreen project (<http://www.redlightgreen.com/>), which aims to provide useful, authoritative research information for college students...

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By Robert Yaffee

Panel data analysis is an increasingly popular form of longitudinal data analysis among social and behavioral science researchers...

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Browse the table of contents, or select an option from this menu:

NYUHome & E-mail

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Current Issue



Archives



About Connect

### The New NYUHome: Improving Community & Communication

By Gary Chapman & Jodi Goldberg

NYUHome, the University's web portal to a wide range of services and resources, was upgraded to version 4.0 in August 2003. Two major features of the new release reflect both the promise and the challenge of the Internet today. A new NYU Events Calendar demonstrates that web-based applications can continue to enhance our community life, while a new anti-spam service reflects the need for measures to combat the degradation of Internet communications, represented in this case by unsolicited bulk e-mail.

#### An Enterprise Calendar

The new NYU Events Calendar, located in the News tab within NYUHome, displays an ever-increasing number of lectures, concerts, meetings and other events taking place each day at the University. What's new is that, "under the hood", the calendar is really a collection of calendars—different campus organizations can each have their own individual calendar, with public events posted to the main University calendar as appropriate.

Thus, the new calendar is truly an enterprise application; it allows the flexibility of individual, focused use by separate groups and organizations, and the freedom to invite the entire University community to participate as interest dictates.



Figure 1. NYUHome's new Events Calendar, located in the News tab.

## Customizable Spam Filtering

NYUHome's new anti-spam tool was implemented in response to frequent requests for a way to "stop the incoming SPAM!" For some people within NYU, and for many in the outside world, unsolicited and unwanted e-mail has come to represent 50% or more of the mail in their inboxes. And some of these messages are more than simply annoying; they may be considered offensive. While it may be easy for a person to tell the difference between unwanted spam and desired correspondence, it is not so easy for a computer program to tell the difference and automatically reject the junk mail. For example, a regular shopper at amazon.com or another e-commerce site might wish to receive e-mail messages from that service which, to a non-customer or filtering program, may look very much like spam. Since ITS has made a commitment that "the mail must go through," we have approached this problem with care, offering a new anti-spam feature that allows each individual person who uses NYUHome to select options which most suit his or her e-mail preferences.

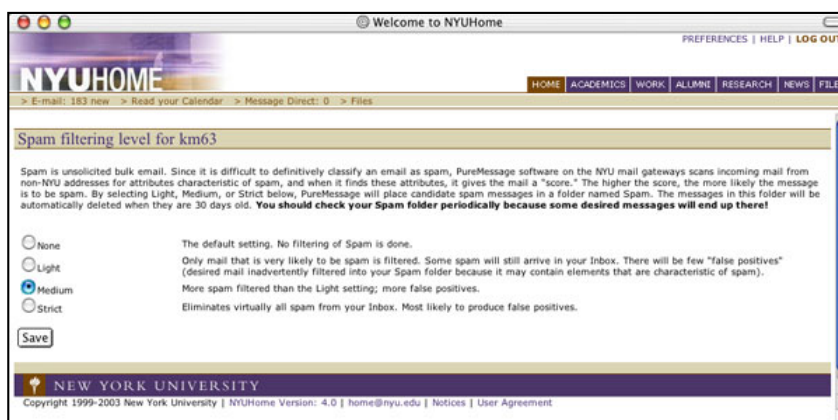


Figure 2. Spam filter settings are located in NYUHome's Preferences section.

The PureMessage anti-spam software implemented on our NYU mail gateways in version 4.0 of NYUHome scans incoming mail from outside the University for attributes characteristic of spam. When it finds these attributes, it gives the mail message a "score" before sending it on to its destination. The higher the score, the more likely the message is to be spam. This score is actually inserted into header lines that each e-mail message contains, lines containing arcane details—about routing, for example—that are normally hidden, so as to enhance the message's readability. Once mail messages are given a spam rating, it's possible for the recipient's e-mail software to take action based upon the score, with the type of action customized for each individual.

## NYUHome Webmail & Desktop Client Customization

Within the NYUHome webmail client, Messenger Express, in the Preferences section, an individual can easily set the NYUHome e-mail server to automatically filter messages given a specified score (or higher) into a "Spam" folder. Several levels of filtering are available, and messages are automatically deleted from the Spam folder after 30 days.

Alternately, individuals who desire greater flexibility can instead customize a desktop e-mail client such as Eudora, Macintosh Mail (for OS X), Netscape Messenger, Outlook (PC only) and Outlook Express (Macintosh only) to handle the incoming messages in exactly the way they want by configuring e-mail filters.

For more information, see "[Take Back Your Inbox!](#)", or check the NYUHome Help on spam filtering, <http://home.nyu.edu/help/mail/spamfilter.nyu>.

### Check Your Spam Folder

It is important to remember that, whether you enable automatic spam filtering via NYUHome or set up your own customized spam-handling filters in a desktop e-mail client, some legitimate messages will occasionally be categorized as spam and land in your spam or Trash folder by mistake. For example, messages containing many capital letters or exclamation points, or phrases such as "click here", are often assigned a high spam rating. Therefore, it is important to check your spam or Trash folder regularly to ensure that you do not miss any legitimate messages.

We hope that everyone enjoys the new NYU Events Calendar, and benefits from the anti-spam filtering service now offered by NYUHome. For information about additional features of NYUHome version 4.0 and for news about upcoming enhancements, visit <http://home.nyu.edu/about/version/>. Please send your comments and questions about NYUHome to [home@nyu.edu](mailto:home@nyu.edu).

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### Author Biography

*Gary Chapman is Senior IT Architect for ITS eServices. He can be reached at [gary.chapman@nyu.edu](mailto:gary.chapman@nyu.edu).*

*Jodi Goldberg is an Information Technology Specialist for ITS eServices. She can be reached at [jodi.goldberg@nyu.edu](mailto:jodi.goldberg@nyu.edu).*

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NYUHome & E-mail

[Print this article \(133K PDF\)](#)



Current Issue



Archives



About Connect

## Take Back Your Inbox! How to Customize Your E-mail Filters

By [Eduardo DeLeón](#)

Recent versions of many e-mail programs include a function that performs automatic junk mail ("spam") filtering, saving you time and grief. Programs such as NYUHome's webmail client, Eudora v.6, Netscape v.7.1, Apple Mail, Microsoft Outlook v.2003, and Outlook Express have automatic junk mail filtering features that can remove more than 90% of unwanted e-mails from your inbox.

These programs then offer a variety of options for handling this junk mail (e.g., send it straight to the Trash, or move it to a "Spam" folder for review), allowing you to customize your mail program to your needs.

### Filtering E-mail in NYUHome

In NYUHome, automatic spam filtering is performed by PureMessage software. To begin with, PureMessage assigns each piece of incoming non-NYU e-mail a spam rating, based on how many characteristics of junk mail it contains (e.g., "click here" links, many exclamations points). PureMessage uses a system of "X's" to score each message (the more "X's", the more likely it is to be spam) and adds this rating to the header of each message.

To activate spam filtering in the NYUHome webmail client, log in at <http://home.nyu.edu> and click on "Preferences". In the window that opens, under "Spam Filtering," click on "Set!" You can then select a filtering level of Light, Medium, Strict, or None, according to your preference. When enabled, this tool will automatically move messages it has rated as junk mail to a folder called "Spam", where they are automatically deleted after 30 days.

You should be sure to review the contents of the Spam folder periodically to ensure

that no legitimate messages have been sent there by mistake. See the article [The New NYUHome](#) in this issue for more information about NYUHome's spam rating and filtering capabilities.

### Filtering E-mail With Eudora

The Eudora v.6 desktop e-mail client also offers spam-filtering capabilities. NYU community members can configure Eudora to use NYUHome's spam ratings to help sort your mail. Eudora can be set to take a specified action (such as "Send to Trash") based on the "score" or number of X's that PureMessage has added to each message's header. Please note that if you use Eudora to check your NYUHome e-mail, you should only have a spam filter activated in one of the programs, not both.

To configure Eudora to filter your messages:

1. Go to the Tools menu and select Filters. Click "New" to create a new filter.
2. In the "Match" section on the right, select the "Incoming" and "Manual" checkboxes. This will apply the filter to all incoming messages, and whenever you manually request to filter messages.
3. In the "Header" field, enter "X-Spam-Level:" (without the quotation marks). If you would like to filter for other conditions, you can select a different field from the pull-down list.
4. In the next field, select "contains".
5. In the next field (a textbox), enter XXXXXX for light filtering, XXXX for medium filtering, or XXX for strict filtering of spam. The more likely it is that the message is spam, the more X's it will have in the X-Spam-Level field.
6. Next, select the action to be taken if and when such a message is detected. There are many actions to choose from, but we recommend that you "Transfer To" a designated spam folder of your choice, rather than deleting the message outright. This will give you the opportunity to review the messages in the spam folder before they are deleted, an important safeguard since the spam filter will occasionally mistake legitimate e-mail for spam.

Another way to create filters in Eudora is to select an offending message from your message list and make a filter out of it. To do this, select a message that you consider spam, then go to the "Special" menu and select "Make Filter". This will take the currently selected message's header information and allow you to edit a filter for it. You will then be able to select from the same options described above.

### Filtering E-mail With Microsoft Outlook

To filter spam with Microsoft Outlook, follow these steps:

1. Go to the Tools menu and select the "Rules Wizard" option.
2. The "Rules Wizard" window will open. In the section that reads "Apply changes to this folder", select your Inbox from the pull-down menu.
3. Click "New" to create a new rule.
4. Select the option for "Start from a blank rule". Make sure the "Check messages when they arrive" option is highlighted, then click "Next".
5. In the section entitled "Which condition(s) do you want to check?", select the box that reads "with specific words in the message header".
6. Under "Rule description", click on the underlined portion that reads "specific words" to edit the selection.
7. The "Search Text" window will open. This is where you define the spam filtering message header and set the level of spam filtering that you desire.
  - a. To choose the "Light" setting, type: X-Spam-Level: XXXXXX
  - b. To choose the "Medium" setting, type: X-Spam-Level: XXXX
  - c. To choose the "Strict" setting, type: X-Spam-Level: XXX

8. After adding the text, click "Add", then "OK". Then click "Next" to advance to the next screen.
9. In the section entitled "What do you want to do with the message?", check the box that reads "Move it to the specified folder". Under "Rule description", click on the underlined portion that reads "specified" to edit the selection.
10. A window will pop up asking you to select a destination folder from your "Personal Folders" or create a new folder. Click on the "New" button to create a new folder.
11. Create a folder called "Spam" (or any other name of your choice). This will be the folder in which mail filtered as spam will be stored. Click "OK" to save your new folder, then click "Next".
12. The "Add any exceptions" screen will allow you to add other settings to your filter. We recommend that you do not add any other settings and instead click "Next".
13. Name your new filter rule (by default, the filter itself is listed as the name). Make sure to check the box that reads "Turn on this rule". Click "Finish" to put your changes into effect, then click "OK" to return to your mailbox.

### Filtering E-mail in PINE

1. In PINE, press [M] to go to the [M]ain menu, then press [S] for [S]etup, [R] for [R]ules, and [F] for [F]ilters.
2. Next, press [A] to [A]dd a new filter. Then, in the nickname field, type in a name for the new filter (e.g., Spam Filter).
3. In the "Current Folder Type" field, select "E-mail" so that it runs this filter on all e-mail boxes, or specify the mailbox on which you want to run filters.
4. Select the option "Add Extra Headers" and add the header "X-Spam-Level" (without the quotation marks; do not use a colon after "Level").
5. Next, select the header "X-Spam-Level" to edit it, and enter "XXXXXX" for light filtering, "XXXX" for medium filtering, or "XXX" for strict filtering (do not include quotation marks). Remember, the more X's in the X-Spam-Level field, the more likely the message is spam.
6. Then, scroll down the page to specify the action(s) to be taken on messages with the criteria you have specified. In the section "Actions Begin Here", select the Filter Action that you want: "Just change status", "Delete", or "Move to folder". We recommend that you select "Move to folder" and then either enter the name of a folder or press Control-T to select a folder from your mail collection lists.
7. When you are done entering all the information, press [E] to [E]xit. Then, if you are done creating filters, press [E] again to [E]xit the filters configuration.

### Additional Information

If you have any questions about configuring your e-mail client to filter your messages, please contact the ITS Client Services Center at 1-212-998-3333 or [its.clientservices@nyu.edu](mailto:clientservices@nyu.edu), open from 8:00 a.m. to midnight, Monday through Friday, and from noon to midnight, Saturday and Sunday.

Customized spam filtering is also available in the Macintosh version of Outlook Express. For configuration instructions, and for additional information about e-mail spam, please browse the NYUHome Help website at <http://home.nyu.edu/help/mail/spamfilter.nyu>.

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### Author Biography

*Eduardo DeLeón is a User Support Specialist at the ITS Client Services Center. He*

can be reached at [eduardo.deleon@nyu.edu](mailto:eduardo.deleon@nyu.edu).

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Browse the table of contents, or select an option from this menu:



Current Issue



Archives



About Connect

Computing in the Arts

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### ArtBots: The Robot Talent Show

By **Philip Galanter**

On July 12 and 13, 2003, the second annual international *ArtBots: The Robot Talent Show* took place at EYEBEAM Gallery in New York City. Produced by Columbia University's Computer Music Center and *ArtBots* Director Douglas Repetto, the exhibit featured 22 artists and groups from six countries.

Over the two-day run, there were more than 2,400 visitors, and *ArtBots* garnered significant international, national, and local coverage in print, on television and radio, and on the Web. (A number of website URLs for individual artists, sponsors, and press coverage are available at the event's main site: <http://artbots.org>.) I co-curated the exhibit with Columbia's Repetto, and Jenny Lee of the Pratt Institute. There were also several current and former NYU faculty and students involved as artists.

The notion of *ArtBots* as a robotic talent show is intended to imply a certain lightheartedness in celebrating robotic art, while at the same time acknowledging the rapid rate of development in this field. Robotic art can include machines that draw, sculpt, play music, dance, and perform, as well as other artistic activities not so easily categorized. In some cases the ArtBot makes the art, and in other cases the ArtBot is the art. Both an Audience Choice prize (with each visitor getting a vote) and a Robot's Choice prize (with each artist or team getting a vote) were awarded.

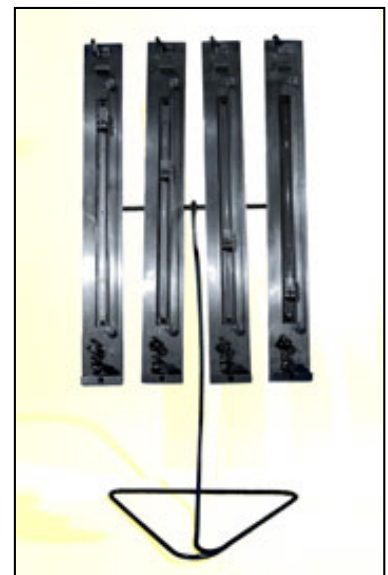


Figure 1. LEMUR's "GuitarBot", winner of the Audience Choice award.

In curating the show, we tried to allow for very broad notions as to what a robot, and what art, is. Originally, the term "robot" came from the Czech root for "labor" or "drudgery", and indeed the original idea was to off-load tedious work to humanoid mechanisms which could serve as slaves without posing an ethical dilemma.

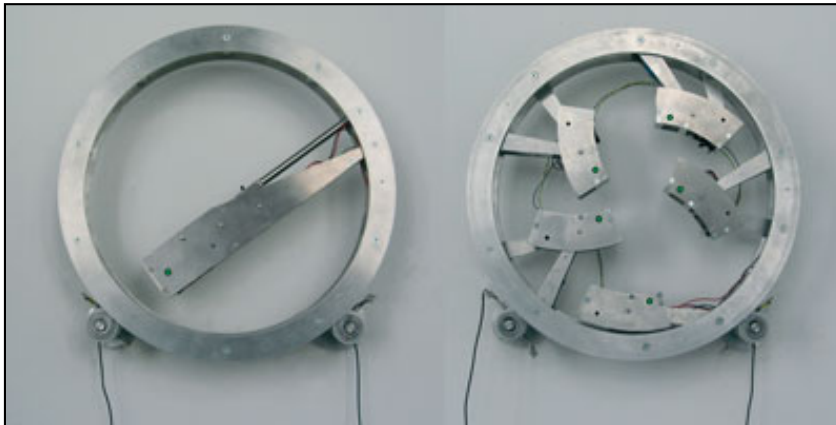


Figure 2. "micro.adam" and "micro.eve", by Julius Popp.

In the case of *ArtBots*, the emphasis is more on play than work, although like most art, it can be serious play indeed. When thinking about robots, we gravitated towards systems that moved in non-trivial ways (no "my printer is a robot" please!), and systems that exhibited some degree of autonomy. It is notable that most so-called robots featured on the popular BattleBot-style television shows exhibit little autonomy, and are in fact merely radio-controlled cars fitted with armor and weapons. Not surprisingly, ArtBots are usually a bit smarter than that!



Figure 3. David Bowen's "50 Drones".

Some of the ArtBots were only vaguely robotic in the popular sense, but commented cleverly on the field in an engaging way, or encouraged an expanded appreciation of what a robot might be. One of the goals of the show was to appeal to a non-technical audience, and especially children, while at the same time invoking some deeply philosophical issues. What is creativity and authorship? Can a machine think? What is consciousness? These questions and more were in play despite the cybernetic carnival atmosphere of the event.

The Audience Choice award was won by "LEMUR: the League of Electronic Musical Urban Robots". A rather large team, based in Brooklyn and led by Eric Singer, created and displayed a number of systems, performing both as individuals and as a group. The centerpiece was "GuitarBot", a set of four beautifully machined slide guitars that play under computer control with great precision and expressiveness. In addition, the more anthropomorphic "ShivaBot" quietly plays drums and chimes, the "TibetBot" plays Tibetan prayer bowls, and the "!rBot" (pronounced chik-r-bot) plays a system of shakers on long, undulating, plant-like flexible rods.

In sharp contrast to this large team approach, the Robot's Choice award was won by Julius Popp, an individual artist from Germany. His elegant works "micro.adam" and "micro.eve" are

finely crafted wheel-like mechanisms that are not programmed overtly, but rather start from scratch and learn to rotate themselves on their wall-mounted posts. They do this by learning to shift their center of gravity by moving actuators and weights within the wheel. As wall-mounted sculpture, "micro.adam" and "micro.eve" present strong physical metaphors for self-discovery of both mind and body.



Figure 4. "Automated Architecture Robot" by Ira Spool and Anna Tsy-pin, uses water to sculpt architectural models out of large blocks of ice.

David Bowen's "50 Drones" creates an ever-changing jellyfish-like sculpture, with 50 tiny electric wheeled vehicles interacting as they randomly move about at the end of 10-foot long power cord tethers. "Automated Architecture Robot" by Ira Spool and Anna Tsy-pin sculpts architectural models of possible dwellings out of large blocks of ice (see Fig. 4). This is done by selectively melting the ice with the release of multiple streams of water. Last year's Robot's Choice winner, Stefan Prosky, contributed "BabyBott", giant baby bottles that waddle along the floor and interact with people by making sounds when picked up and held.

"Chair de Poule", by Brad Todd, was one of several tele-robotic works. Audience members could interact via the Internet with a physical construction in Montreal made of books, pins, dust, and the hair of the artist's late father. A system of precisely-machined arms and motors, "Drawing Machine 3.1415926 v.2", by Fernando Orellana, harnesses the science of deterministic chaos as well as sound input to create finely detailed 4' by 4' pen and ink drawings (see Fig. 5). "Drums of War", by Rahul Bhargava and Mira Friedlander, maps regional news reports automatically gathered from the Internet into drum performances that correspond to the relative levels of violence for a given date and location.

Artists Dan Paluska, Jessica Banks, and jackbackrack created "Fotron2000 (FOE-tron-too-THAU-zin(d))". This photobooth-like system uses high-tech image analysis algorithms to generate corresponding paths and steer a tiny lamp-wielding motorized car. The moving car is, in turn, photographed over time, resulting in a unique neon-looking portrait.

"Happy Feet", by Stephen Turbek, presents a set of shoes which tapdance on their



Figure 5. "Drawing Machine 3.1415926 v.2",  
by Fernando Orellana.

"MEART—The semi-living artist" is a somewhat controversial cross-continental effort by the Australian SymbioticA Research Group, in collaboration with Steve Potter's Lab at the Georgia Institute of Technology in Atlanta (see Fig. 6). In this installation, a digital photograph taken at the New York exhibit was sent via the Internet to stimulate a culture of living neural cells in Atlanta. The response of those cells was then sent back to the exhibit in New York and used to drive a system of robotic arms that draw a 'portrait'. Having been featured in both science and art news media, and using actual living nerve tissue, "MEART" pushes a number of social and bio-ethical hot buttons.

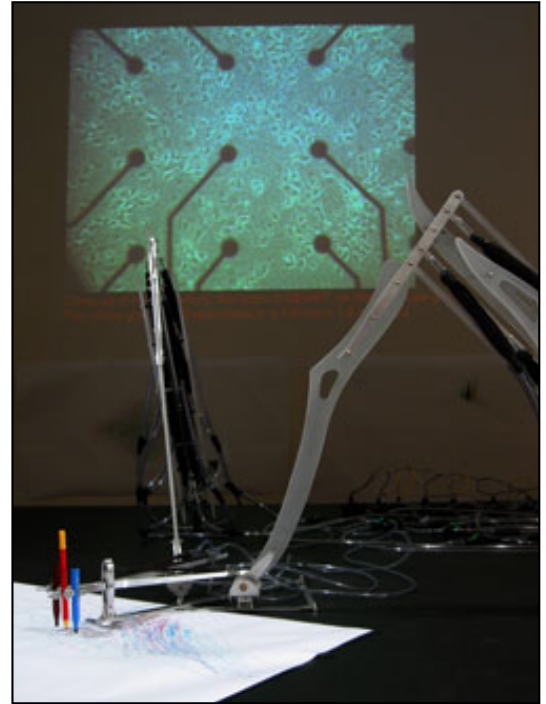


Figure 6. "MEART", a controversial ArtBot.

"Monkey on Your Back", by longtime robot artist Kal Spelletich and his group SEEMEN, is a wearable device that extends one's organic motor skills and abilities with robotic arms and hands, and a robotic tail. Jason Van Anden's "Neil" is a sculptural robot that interacts with observers by moving its large, head-like video monitor, and registers emotion by varying its display of a cartoon-like mouth. Twins Leesa and Nicole Abahuni's "re-capacitance" utilizes a clear drawing table and robotic drawing machines, along with real-time interaction by participants using colored pens, as a platform for cultural exchange.



Figure 7. Stijn Slabbinck's  
"Scratchrobot".

"Robots Like H<sub>2</sub>O: Photosynthesis Perpetual Motion Machine" is a work by Futurefarmers, a.k.a. Amy Franceschini and Michael Swaine. It consists of a pair of plants on a mechanical pedal device that will actually move forward a fraction of an inch per week. This work is a softer/gentler "MEART", stimulating questions about the cyborgian interface between the mechanical and biological.

Stijn Slabbinck's "Scratchrobot" is a robotic turntable DJ artist that creates scratch performances based on the e-mail people send to it. The resulting sound is digitized and then returned to the writer via e-mail. "Shootings (After Francisco de Goya)" by Han Gene Paik is a haunting installation of children's dolls retrofitted with

animatronics. "Slowscan Soundwave", by ArtBots Director Douglas Irving Repetto, is a wooden frame with delicate plastic strips that oscillate to illustrate nearby sound, which is detected with a hidden microphone and translated into motion via digital signal processing.

"Small work for robot and insects", by the collective Host Productions, pairs a collection of actual insects (crickets) with a larger robotic insect. The robotic insect attempts to communicate by detecting the chirping of the nearby crickets, and by using digital neural network technology to trigger various actuators and lights.

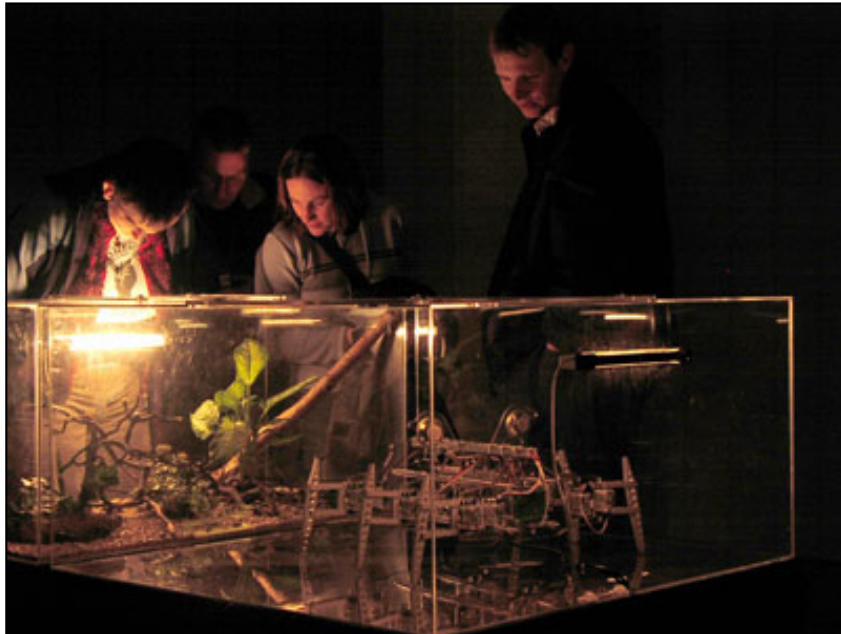


Figure 8. "Small work for robot and insects" by Host Productions.

"Tribblication" is a work by Josh Lifton, Michael Broxton, and Joseph Paradiso from the Responsive Environments Group at MIT's Media Lab. The only work at *ArtBots* 2003 that didn't move, Tribble (The Robotic Interactive Ball-Based Living Entity) is a highly responsive object that exhibits and explores the sensory possibilities of skin and touch in robotics. John S. Lathram III's "The Watchers—Televisuality for Xenia" is another hybrid that combines organic forms and technology to raise social and political concerns. His plant-like constructions use computer and video technology to detect, track, and monitor the audience at the exhibit.

An annual event in its second year, the 2003 *ArtBots: The Robot Talent Show* was a significant expansion over the previous year. Interest in this and similar exhibits has been growing, and it seems likely that next year's *ArtBots* will present another round of progress in the aesthetics, meaning, and technology of robotics. For more information about this event, visit the *ArtBots* website, <http://artbots.org>.

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### Author Biography

*Phil Galanter is Associate Director of the Arts Technology Group at ITS Academic Computing Services. He can be reached at [galanter@nyu.edu](mailto:galanter@nyu.edu).*

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F a l l 2 0 0 3 E d i t i o n

Browse the table of contents, or select an option from this menu:



Current Issue



Archives



About Connect

Computing in the Arts

[Print this article \(196K PDF\)](#)

### Close Encounters: Performance Art, Politics & Technology

By [Kate Monahan](#)

This past July, NYU hosted *Encuentro 2003, Spectacles of Religiosities*, a ten-day event organized by the Hemispheric Institute of Performance and Politics. The Institute is a consortium of institutions, artists, activists, and scholars from across the Americas dedicated to exploring the relationship between performance and social and political life in this hemisphere.

The Encuentro ("encounter," in Spanish) is an annual event—part seminar, part academic conference—that brings together the Institute's far-flung members in an investigation of a particular topic within this discipline. This is the first year that the event has been held in the United States; past years' Encuentros have been held in Brazil (2000), Mexico (2001) and Peru (2002).

This year's Encuentro focused on the interplay between religion and political power, and featured an impressive collection of lectures, live performances, installations,



Figure 1. At the *Encuentro*, as part of a Digital Photography Workshop taught by Lorie Novak, Chair of the Photography and Imaging Department (TSOA), participants select images to hang in their final photo exhibit. (Photo by Lorie Novak.)

discussions, and hands-on work-shops, many of which relied heavily upon multimedia and web technologies (see Figures 1 and 3). Various performances and installations utilized physical computing, digital projection, audio, video, online chat, or webcasting, often in innovative combinations.

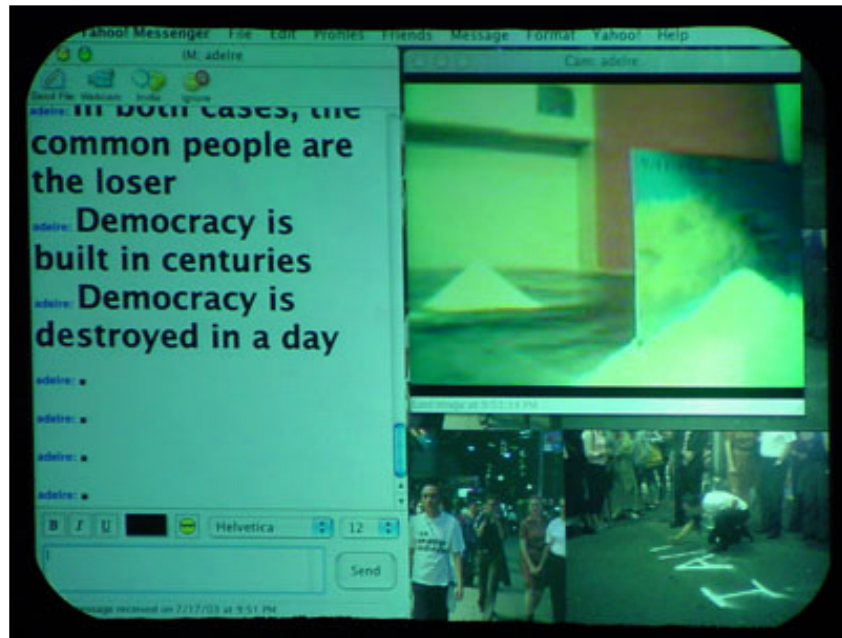


Figure 2. One of the projection screens during the webcast performance of the "Anti-War, Anti-Empire Cabaret". (Photo by Juan Ortiz.)

For example, as part of "The Anti-War, Anti-Empire Cabaret", ITS collaborated with the Institute to organize a two-way interactive webcast of an event which integrated sound, digital images, online chat, and simultaneous live performances by two physically distant artists—one in New York and another in Chile (see Figure 2). The event was an impressive demonstration of recent advances in Internet technologies, and effectively created a sense of fellowship between participants at the two remote sites through a shared experience.

### Closing the Distance with Internet Technologies

To build upon the sense of community and energy generated at each *Encuentro*, The Hemispheric Institute has developed a variety of ways to keep an active dialogue going throughout the year. Institute Director Diana Taylor emphasized the importance of communication via web technologies at the Encuentro 2003 welcome session at NYU's new Kimmel Center for University Life.

Demonstrating the Institute's website, <http://hemi.nyu.edu>, Ms. Taylor described how the consortium has used the Web to build community and facilitate collaboration across the great distances from which Institute members interact. The Institute's initiatives in this realm include a web-based Hemispheric course, online forums and a newsletter, online curations for multimedia materials known as "Web-Cuadernos", and a digital archive.

Explaining that one goal of the Encuentro is "to archive work, because this is often a failing of performance," Taylor led the welcome session attendees in a brief tour of the Institute's web-based archive (<http://hemi.nyu.edu/eng/archive/index.shtml>). This growing collection includes bibliographies, course materials and student projects, and a searchable video archive, produced in collaboration with ITS and NYU's Studio for Digital Projects and Research (<http://www.nyu.edu/studio/>), which

houses video interviews with performance experts and artists, and short performance excerpts. This archive not only preserves the often-ephemeral work of many performance artists and scholars, but also facilitates the sharing of ideas and artwork among community members through the easily accessible medium of the Internet.

Similarly, the Institute's Web-Cuadernos, available at <http://hemi.nyu.edu/eng/cuaderno.shtml>, are an online vehicle for idea exchange and development. As described on the website, these curations "focus on particular topics and/or bodies of work relating to performance and politics in the Americas. They contain combinations of photos, videos, texts, hyperlinks, bibliographies, and audio recordings." The Web-Cuadernos are ongoing works-in-progress, which community members are encouraged to add to, adapt, or create anew.

Other online tools, including topic-based web-boards and discussion forums (<http://hemi.nyu.edu/eng/forums.shtml>), also help promote communication and collaboration among Institute members.

For more information about the Hemispheric Institute for Performance and Politics, visit <http://hemi.nyu.edu> or write to [hemisphere@nyu.edu](mailto:hemisphere@nyu.edu). For additional information about *Encuentro 2003: Spectacles of Religiosities*, please visit <http://hemi.nyu.edu/eng/seminar/usa/indexnyc.shtml>.

## References

- *Spectacles of Religiosities*, conference program, <http://www.hemi.nyu.edu/eng/seminar/usa/index2003.shtml>, July 2003.
- *Hemispheric Institute of Performance and Politics*, website, <http://hemi.nyu.edu>.
- "NYU's Hemispheric Institute of Performance and Politics to Hold its 4th Annual International Seminar & Summer Course in New York, July 11-19", NYU Press Release, [http://www.nyu.edu/publicaffairs/newsreleases/b\\_encuentro\\_2003.shtml](http://www.nyu.edu/publicaffairs/newsreleases/b_encuentro_2003.shtml), June 9, 2003.

## Author Biography

*Kate Monahan is a Technical Writer and Editor within the Publications Group of ITS Client Services. She can be reached at [kate@nyu.edu](mailto:kate@nyu.edu).*



Figure 3. Techno Jesus, an installation created by one of the participants in "Mortuary Dioramas and Human Altars," a workshop led by Guillermo Gómez-Peña. (Photo by Marlène Ramírez-Cancio.)

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## Information Technology at NYU



Search This Site

F a l l 2 0 0 3 E d i t i o n

Browse the table of contents, or select an option from this menu:

Wireless Computing

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Current Issue



Archives



About Connect

### The NYURoam Wireless Network It's Where You're Going!

By **Carlo Cernivani**

You've probably seen them, those people sitting in Starbucks, sipping a double latté and browsing the Internet on their laptop computers. What makes this kind of mobility possible is wireless data networking, an exciting new service that is now available to the University community through the NYURoam network.

#### New Technology—Unique Opportunities

Wireless networks are becoming increasingly mainstream, as more "wireless aware" people look for ways to remain connected—in an unconnected way. Wireless "hot spots", public locations that offer high-speed Internet access for people with wireless-enabled laptops or devices, are in demand and growing in number. And a wide range of devices and applications are being developed to take advantage of this expanding technology.

Whether from your living room couch or at an airport, in a conference center or in a



Figure 1. NYURoam allows you the freedom to work where you choose.

classroom, your "online world" can be accessed in more and more of the places you frequent. Wireless networking offers unique opportunities in education, research and communication. Such a technology is sure to thrive in a university environment, especially one as diverse as New York University's.

The NYURoam wireless network has been designed to offer ubiquitous, secure access to resources on NYU-NET (NYU's network) and the Internet at a growing number of locations around campus. This new network provides NYU community members with mobility and flexibility by enabling them to access network resources without being tied to a physical (wired) location.

Although the technology behind wireless networking has been in existence for several years, it has taken time for it to mature to the point at which a secure, flexible, enterprise-scale service such as ours could be deployed. ITS has been moving towards the rollout of NYURoam for some time, and contending with a myriad of technical issues along the way.

### New Technology—Special Challenges

Wireless technology is continually evolving, and standards, which are the foundation of reliable equipment interoperability, are still a point of contention among major manufacturers. As a result, ITS has had to strike a balance between pre-standard and standard wireless functions in order to offer support to the NYU community for the widest possible range of hardware and operating systems. Eventually, the emergence of a standard that ensures uniformity on how wireless clients authenticate and securely handle data will broaden the supported base of devices and streamline the access process.

There are numerous complexities associated with designing and supporting an enterprise-scale wireless network. NYU's urban location places us in a rather "polluted" wireless environment. The radio frequency at which 802.11b\* wireless equipment operates is filled with radio traffic generated in the vicinity of NYU's Washington Square campus.



Figure 2. NYURoam is currently available at a variety of locations around campus, including Levels A and B of Bobst Library.

Numerous radio networks can be detected as one walks around campus—on Mercer Street, Broadway, West 3rd Street, etc.—emanating from surrounding residences and businesses. Inspect the Verizon phone "booths" along West 4th Street, for example, and you will see small, dome-like devices atop the phones' enclosures; these are wireless access points delivering wireless network access to Verizon customers. This co-habitation of diverse independent networks causes high levels of radio traffic, which can take a toll on transmission speed and signal quality.

Ensuring full radio coverage within NYU buildings presents another set of challenges. Deployments in classrooms, lounges, and similar

areas are relatively straightforward. Areas in which signals must penetrate walls and other obstructions, however, pose a tougher wireless design problem, requiring careful placement of the wireless access points that deliver the network's radio signal.

The 802.11b standard also creates limitations. For instance, there are only three distinct radio channels to work with, and each wireless access point in a given location should be kept "out of sight" of the other access points on the same channel.

### A Reliable, Scalable Wireless Network

To ensure the best level of coverage possible in each supported location, ITS installs enough access points to create an adequate degree of redundancy. This tactic not only provides the area with greater bandwidth, but also acts as backup in the event of a malfunctioning access point. In addition, this configuration will allow for a smooth transition in the future, when ITS upgrades NYURoam to the next-generation wireless standard, 802.11g, since this newer standard will result in a smaller coverage area for a given access point. Wireless design is a strategic game played in three dimensions, with rules dictated by such factors as variable radio transmission levels, antenna types, building construction, and a variety of hidden surprises.

One important thing to keep in mind about NYURoam, however, is that it is, after all, a radio-based service and should not be considered a replacement for NYU-NET's hardwired infrastructure. There are many external factors that can affect your connection to NYURoam—factors which cannot be readily controlled.

An appropriate analogy would be that NYURoam is to the hardwired network what cellular phones are to hardwired telephones. People who have become reliant on their cell phones don't necessarily expect sound quality to be so good they "could hear a pin drop" and accept the fact that potential problems go with the radio territory. The same expectation level should apply to NYURoam.



Figure 3. The NYURoam wireless network expands classroom horizons.

ITS has and will continue to make every effort to provide as reliable a service as possible, but please remember that wireless networks are a shared medium: another person using a misconfigured wireless client in your vicinity, or a malfunctioning wireless card, can cause you to experience problems with performance or connectivity.

### Getting Started

Despite these and other challenges, ITS has been successful in crafting a convenient, reliable, and scalable wireless network for the NYU community. For more information about NYURoam, including detailed set-up instructions, an

interactive map of access locations, and in-depth details about the network architecture, please visit <http://www.nyu.edu/its/wireless/>.

\* 802.11b is the wireless standard currently supported by NYUroam; see <http://www.nyu.edu/its/wireless/security.html> for more information.

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### **Author Biography**

*Carlo Cernivani is Senior Data Communications Manager for ITS Network Services. He can be reached at [carlo.cernivani@nyu.edu](mailto:carlo.cernivani@nyu.edu).*

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## Information Technology at NYU



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Browse the table of contents, or select an option from this menu:



Current Issue



Archives



About Connect

Humanities Computing

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### Publishing XML Files on the Web

By [Matthew Zimmerman](#)

The Humanities Computing Group within ITS' Academic Computing Services is working with the FAS Department of History on a web-based publication project, *The Public Writings of Margaret Sanger*. This online edition is part of a much larger endeavor, *The Margaret Sanger Papers Project*, which includes an already completed microfilm edition of over 9,000 of Sanger's documents, plus a four-volume book edition of Sanger's papers, the first volume of which has been published with the title *The Woman Rebel, 1900-1928*.

Although, when completed, the online edition will be much smaller than either the microfilm or print edition (600 documents), it represents an important part of the project, as it will create a new level of accessibility to the writings of Sanger, a noted social reformer and birth control advocate in the first half of the 20th century.

Project Director and Editor Dr. Esther Katz, Assistant Director and Associate Editor Cathy Moran Hajo, and Associate Editor Peter C. Engelman have chosen XML as the format in which to store the transcribed Sanger documents. XML was selected because it is the standard storage method for transcribed documents in the field of digital libraries and archives. One reason XML is the standard is its application- and platform-independence, which allows for interoperable storage, exchange, and usage. Since XML files are text files, they can be stored in the file system of any operating system (Windows, UNIX, Linux, Macintosh) and be read and manipulated by any program (word processor, web browser, Java program, Perl script, PHP, etc.).

#### XML and HTML

Another reason XML is the standard is its allowance for rich, "descriptive" markup. Although HTML can be used to describe the structure of a document, it is typically used to indicate how a document should be displayed, and is limited to demarcation

of headers, paragraphs, line breaks, divisions, and tables, plus some "presentational" information such as font style and size. With XML, on the other hand, it is possible to indicate that strings of text are names, dates, places, titles, footnotes, and so on, or to include whatever categorization is desired.

The code below illustrates the differences between HTML and XML.\* The first section shows how a document would typically be marked up in HTML:

I think the City of **Philadelphia** owes a vote of thanks to this Committee for bringing together this brilliant group of speakers to discuss the subject as it has been discussed today. After listening to some of the papers that I heard, I was reminded of something *H. G. Wells* said last year in talking about the advance of culture and intelligence. He said ["I have one test of intelligence and that is the attitude of the man or woman on birth control, as that is the real test of intelligence."] and I think if you heard, as I did, the statements made today and if you compared those statements and the attitude of mind to the same thoughts that were expressed at this sort of a conference years ago, if we would put these thoughts into the hands of the legislators it would be a great help and the opposition would be forced to come to some sort of a conclusion and let us hear what they have to say.

And this is the same text marked up in XML:

I think the City of `<place reg="Philadelphia, PA" rend="bold"> Philadelphia</place>` owes a vote of thanks to this Committee for bringing together this brilliant group of speakers to discuss the subject as it has been discussed today. After listening to some of the papers that I heard, I was reminded of something `<person reg="Herbert George Wells" rend="italics">H. G. Wells</person>` said last year in talking about the advance of culture and intelligence. He said "`<quote who="WELHE">I have one test of intelligence and that is the attitude of the man or woman on birth control, as that is the real test of intelligence</quote>`," and I think if you heard, as I did, the statements made today and if you compared those statements and the attitude of mind to the same thoughts that were expressed at this sort of a conference years ago, if we would put these thoughts into the hands of the legislators it would be a great help and the opposition would be forced to come to some sort of a conclusion and let us hear what they have to say.

Although this is a rudimentary example, it illustrates how XML turns markup from a tool for describing how a document should be displayed into a system for storing data. If we take these two snippets of code as examples, a program could be written to search the XML document for any person mentioned in the text by looking for the `<person>` element. Then an index of people mentioned in the text could be created. This would not be possible with HTML.

The irony of XML is that one of its greatest strengths, platform- and application-independence, is also one of its weaknesses. Since it is a relatively new technology and since it is not tied to any one program or system, XML can be difficult to work with. The publication of XML files on the Web illustrates this difficulty. Unlike HTML files, which display very nicely across a range of web browsers, documents marked up in XML alone can produce variable and often unsatisfactory results when viewed in a browser.

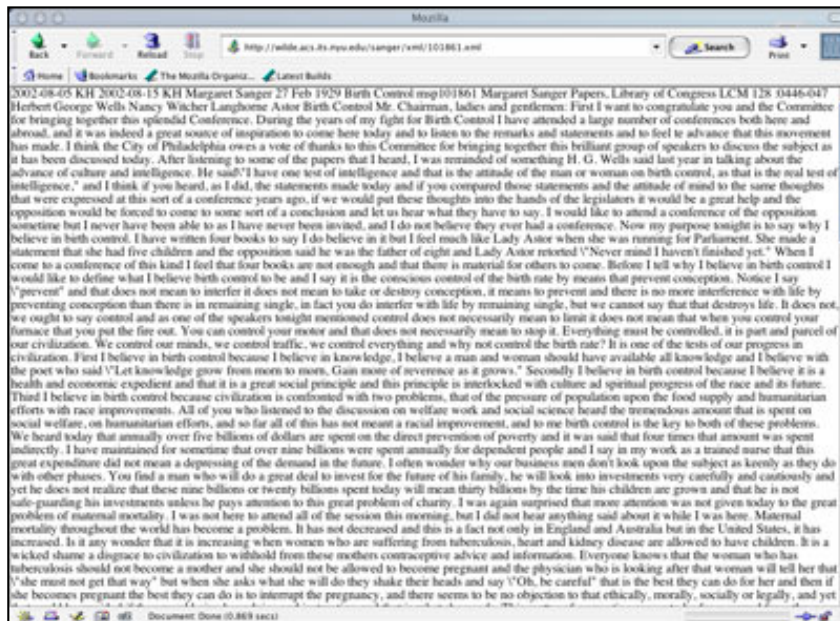


Figure 1. A sample XML document when viewed directly in Mozilla on Macintosh OS X.

Figure 1 shows one of our Sanger XML documents as it appears when viewed directly in Mozilla on Macintosh OS X. The same document viewed in Internet Explorer on Mac OS X is displayed in Figure 2. While the Internet Explorer view is more informative—displaying, as it does, the XML elements in a hierarchical view—this is rarely what a programmer would want the reader to see.

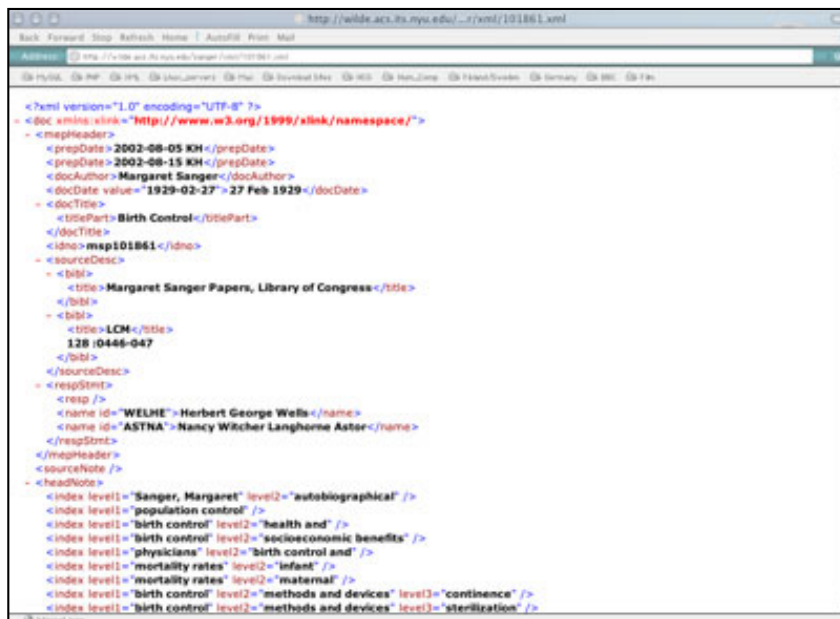


Figure 2. The same document viewed in Internet Explorer on Mac OS X.

## Making XML More Reader-Friendly

W3C (The World Wide Web Consortium), the international Web standards body, has developed and is continuing to develop standards for the publication of XML files on the Web. One method is Cascading Style Sheets (CSS). If you are familiar with HTML, you most likely are aware of Cascading Style Sheets.

A Cascading Style Sheet is a file that allows you to define particular styles for HTML

elements. For instance, with CSS you can indicate that you want all `<h1>` elements to be a certain size, color, and style by specifying it in the style sheet. A typical style definition would look something like:

```
h1{ text-align: center; font-size: 18px; font-weight: bold}
```

The same holds true for XML. You can use a CSS to indicate how certain tags should be displayed (or if they should be displayed at all). Figure 3 shows what our XML document looks like when it has been associated with a CSS. The result is more pleasing to the eye and in line with what a reader would expect.



Figure 3. The sample document after a Cascading Style Sheet has been applied.

For many people, the use of CSS with their XML documents may suffice for their web publication needs. There are limitations, however. Your XML document can only display its information in the order in which it occurs in the document and, more important, you are relying on your reader to have a browser that supports CSS for XML. As of now, browser support of CSS for XML is a bit sketchy; therefore, it is risky to rely on client-side technology for your site to work.

There are other limitations to CSS. There are times when you may want to rearrange the order in which the information in your XML document appears. For instance, the Sanger documents contain a header with metadata (information about the data) concerning author name and date of publication.

```
<mepHeader>
<prepDate>2002-08-05 KH</prepDate>
<prepDate>2002-08-15 KH</prepDate>
<docAuthor>Margaret Sanger</docAuthor>
<docDate value="1929-02-27">27 Feb 1929</docDate>
<docTitle>
<titlePart>Birth Control</titlePart>
</docTitle>
<idno>msp101861</idno>
<sourceDesc>
<bibl>
<title>Margaret Sanger Papers, Library of Congress</title>
</bibl>
<bibl><title>LCM</title> 128 :0446-047</bibl>
</sourceDesc>
<respStmt>
```

```

<resp></resp>
<name id="WELHE">Herbert George Wells</name>
<name id="ASTNA">Nancy Witcher Langhorne Astor</name>
</respStmt>
</mepHeader>

```

This information occurs at the beginning of the XML document but needs to appear in different places when displayed. There are also situations in which you want particular conditions to control which data in the XML document is displayed. For instance, you could have an XML document containing a list of names and addresses. What if you want to display only those names and addresses from a certain city or zip code?

This is where XSLT comes in. XSLT stands for Extensible Stylesheet Language Transformations, a powerful style sheet language developed by W3C to work with XML. XSLT is too powerful and too complex to describe in great detail here, but it works like CSS, in that a style sheet is applied to an XML file.

It is also similar to CSS in that it operates on XML elements specified in the style sheet. However, it does much more than apply styles to these elements. It can apply actions to these elements, such as transforming the element name. It can use programming logic, such as "if/then" conditionals. Most important, it can transform an XML file and output it as another XML file or as an HTML, text, or PDF file, or even stream the output to another program, such as a web browser. Today, XSLT is typically used to transform an XML document into an HTML file that can be easily viewed in a web browser, eliminating any special client-side technology that would be needed to view the XML documents.

XSLT is based on templates. A template is created for a specified XML element. When the style sheet finds that element in the XML document, the template is applied. For instance, there is an element, `<unclear>`, used in the Sanger documents to indicate when a word is unclear in the original document. Perhaps the handwriting is illegible or the print has been smeared. In the Sanger XML file it looks like this:

```

<unclear>some text here</unclear>
<p>In the web browser it should display like this: [some text here?].
<p>The HTML code needed for this output is:
[<em>some text here</em>?]
<p>To complete this transformation, XSLT uses code that looks like this:
<xsl:template match="unclear">
[<em>
<xsl:apply-templates/>
</em>?]
</xsl:template>

```

This translates to: "whenever you come across the `<unclear>` element, print `<em>` and then apply templates". This means search within the `<unclear>` element to see if there are any other elements that need templates applied. If not, just print out the text within the `<unclear>` element. Then print out `"</em>?"`. This transforms `<unclear>some text here</unclear>` to `[<em>some text here</em>?]`, which, when viewed in a web browser, looks like: "[some text here?]

That was a very long explanation for such a simple thing, but once you learn XSLT and discover that you can do very powerful transformations, the promise of XML becomes clear. Your XML document truly becomes a data source from which you can produce any sort of document.

How do you perform these transformations? The style sheet does not just magically transform the XML file into another XML or HTML file. Theoretically, you should be able to link to any XSLT file from your XML document and allow the web browser to

perform the transformation in real time, similar to the way CSS works. This, however, is not the case in reality. Only certain web browsers—and, typically, only the most recent versions of these—successfully perform XSLT transformations. The hope is that someday all web browsers will have the built-in functionality to run XSLT transformations, but at present, you can't rely on this.

In the meantime, you need to use an intermediate piece of software called an XSLT processor that can read the XML file and the XSLT file and output a third file, in our case, HTML. When we were initially developing the style sheet for the Sanger project, we used an XSLT processor named Saxon. Saxon is written in Java and in its simplest form runs as a command-line program. If you are ambitious, you can write your own GUI, but for our purposes the command line worked well.

We used Saxon to test our style sheets by transforming some sample XML documents into HTML files and viewing the HTML files in a web browser. When we were satisfied with the style sheet, we began to look for a more robust solution, preferably one that would do the transformations on the fly. That is, we wanted a person to be able to visit the site and request a certain Sanger document, and have the XML file transformed on the fly and sent to the web browser as a stream of HTML.

That way, as more XML files were added to the collection or changes were made to the files, they would not have to be transformed manually into HTML, and the reader would always get the most recent versions of Sanger documents. Of course, if your documents will be static, you can do the XSLT transformations ahead of time (with Saxon or another processor) and simply store the HTML files on your server for viewing by the reader.

### **Publishing HTML from XML on the Fly**

One possibility we considered was to write a Java applet that would be embedded in a web page and use Saxon to perform the transformations. After some research, however, we decided there was a solution that would require less application programming on our side. That solution was to use PHP with its XSLT extension.

What is PHP? To quote the PHP website (<http://www.php.net>), "PHP is a widely-used general-purpose scripting language that is especially suited to web development and can be embedded into HTML." It is typically used in conjunction with the MySQL database management system and Apache web server to create dynamic websites. It is similar to JSP and the commercial web applications Lasso, Active Server Pages, and Cold Fusion. It is also similar in some respects to Perl and Python.

We have been using PHP in the ITS Humanities Computing Group for over a year for other projects with great success, and it was natural for us to investigate its XSLT capabilities. Lucky for us, PHP can be configured to perform XSLT transformations.

The installation of PHP that comes with most Linux distributions does not have the XSLT extension enabled, so some configuration is needed. First, the Sablotron XSLT processor must be installed. The developers of the XSLT extension for PHP hope to support other processors in the future, but for now Sablotron must be used. Then, PHP must be recompiled and installed to take advantage of the XSLT processor. For detailed instructions on this installation process, see [http://www.nyu.edu/its/humanities/docs/php\\_xslt.html](http://www.nyu.edu/its/humanities/docs/php_xslt.html). Although PHP is typically run on Linux and Unix servers, it can also be installed on Windows as needed.

Once PHP is configured for XSLT transformations, the coding is quite easy. The lines of code that perform the process are simply:

```

$XH = xslt_create();
xslt_process($XH,
"$SAMPLE.XML",
"sample.xsl", "sample.html");

```

The first line creates a new XML processor. This is used for returning errors and other feedback. The next line processes an XML document called "sample.xml", using an XSLT file called "sample.xsl", and outputs an HTML file called "sample.html". What makes PHP easy to use is that its code exists in a file with a .php extension but can be embedded in HTML and accessed through a web browser. This code can easily be added to other PHP and HTML code to produce a page that accepts variables and generates HTML on the fly.

The following is the full PHP code needed to publish an XML document on the fly, (with explanatory comments in *italics* for this example):

```

<?php
/* Allocate a new XSLT processor
$XH = xslt_create();
/* Process an XML document using the XSLT file named "test.xsl". The argument for
the XML document to be processed is not a static file name, but instead a variable
name. The variable value is passed via an URL to this PHP page (http://www.foo.edu/
transform.php?var=filename.xml). There is no HTML file output. Instead, the HTML is
output to the variable named "$result".
$result = xslt_process($XH, "$_GET[var]", "test.xsl");
/* If the transformation is successful ($result has a value) then print out $result. When
PHP prints $result, it is simply sending HTML to the browser as a stream.
if ($result) {
print $result;
}
/* If the transformation did not work, then print out this error message:
else {
print "Sorry, $_GET[var] could not be transformed by test.xsl into $_GET[var] the
reason is that .xslt_error($XH) and the error code is " .xslt_errno($XH);
}
?>

```

These few lines of code allow you to do on-the-fly, server-side XSLT transformations that create nicely formatted HTML documents suitable for the Web. With a little more code, our final product looks very nice indeed. Those awkward XML files we saw in the beginning are now transformed and displayed to the reader as shown in Figure 4.



Figure 4. The sample XML document after on-the-fly, server-side XSLT.

There are other solutions for publishing XML documents on the Web. You can work with the application program interfaces (APIs) provided with Saxon and develop your own server-side transformation system, but it involves more application development time and experience programming in C, C++, or Java. You can also use the Apache suite of products including Cocoon, the XML application server, but these products are still in their early stages of development and not 100% reliable, and also require working with an API to develop your own interface.

PHP is a nice solution because it is free, already installed on most Linux machines, also runs on Windows, relatively easy to configure for use with XSLT, very easy to code, and already works in conjunction with an Apache web server. With very little coding and configuration, you can create a fast and robust XML publishing system.

### Resources

- XML: <http://www.w3.org/XML/>
- CSS: <http://www.w3.org/Style/CSS/>
- XSL & XSLT: <http://www.w3.org/Style/XSL/>
- PHP: <http://www.php.net>
- Saxon: <http://saxon.sourceforge.net/>
- Sablotron: <http://www.gingerall.com>

\* Text source: *Margaret Sanger Papers, Library of Congress, LCM 128:0446-047.*

### Author Biography

*Matthew Zimmerman is a Humanities Computing Specialist in ITS' Academic Computing Services. He can be reached at [matthew.zimmerman@nyu.edu](mailto:matthew.zimmerman@nyu.edu).*

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F a l l 2 0 0 3 E d i t i o n

Browse the table of contents, or select an option from this menu:



Current Issue



Archives



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NYU Libraries

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## NYU Libraries' New Website Unveiled

By **Tom McNulty & Nadaleen Tempelman-Kluit**

NYU Libraries launched its newly redesigned website this fall. The new website is more user friendly and offers a variety of enhancements, including:

- Fewer layers, less clicking
- An easy-to-use list of electronic journals
- Streamlined access to full text journals and books via the "Arch"
- Context-sensitive online help and instruction
- Less library jargon
- Important services, easily found on the homepage

Like many large organizations' websites, our old site reflected our administrative structure, and in some ways it failed to take into account the various ways people actually use the Web. In designing our new site, we put user needs and information-seeking behaviors first.

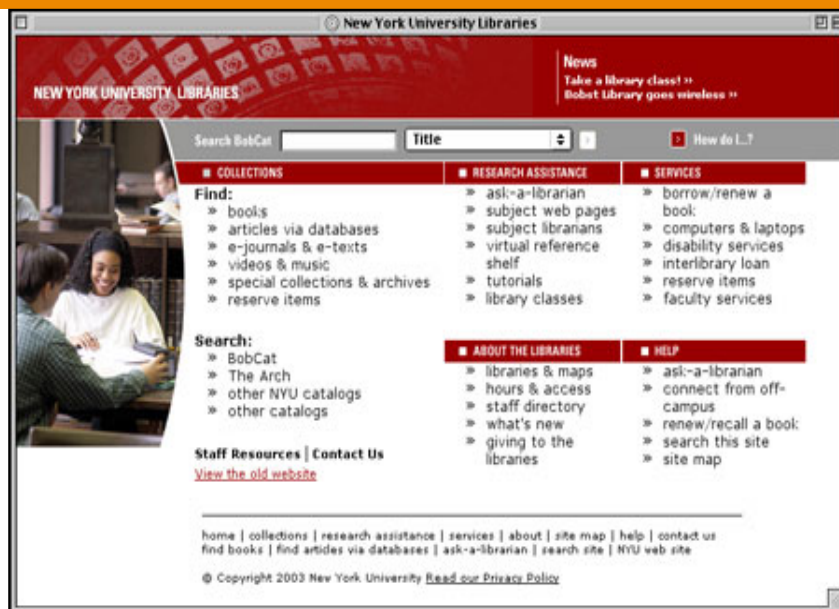


Figure 1. The main page of the redesigned NYU Libraries website, <http://library.nyu.edu>.

To accomplish this, the Library Web Redesign Committee conducted usability tests with NYU community members on our old site, and repeated the same test on the new design. (For more information, see "Web Usability Testing" in the Spring 2002 issue of *Connect* (<http://www.nyu.edu/its/pubs/connect/archives/spring02/libraries.html>)).

### Easier Access to Electronic Information: The Arch

Our newly re-designed website offers reliable access to electronic texts, e-journals, databases, and other online resources and materials through a new feature called The Arch. The Arch relies on a database to provide "on-the-fly" delivery of electronic information in a variety of formats. For example, a scientist in search of indexes to chemistry journals can select his or her subject area, choose "databases" as a format, and find the databases most relevant to the study of chemistry.

### Find Full-Text More Easily with SFX!

Many of our databases provide only citations to articles, and not the full text. In some cases, the actual journal might be available only in print; but in many cases, there is a digital version available through one of our many electronic services (like ProQuest).

However, because the Libraries now offer so many different services, finding the one that contains a desired item has become a bit like searching for a needle in a haystack. At least, this was the case until the arrival of SFX, our new bibliographic citation tool that streamlines the process by making a direct link to the desired item, if it is available electronically.

For more information, see "SFX: Providing Easier Access to E-Journal and Other Digital Scholarly Resources" in the Spring 2003 issue of *Connect* ([http://www.nyu.edu/its/pubs/connect/spring03/mcnulty\\_sfx.html](http://www.nyu.edu/its/pubs/connect/spring03/mcnulty_sfx.html)).

### Online Help, Tutorials, and Ask-a-Librarian

In designing our new site, we recognized the need for context-sensitive direction. Depending upon which of the site's main sections you are in, clicking the "How do

I...?" button will provide a list of frequently asked questions relating to that section.

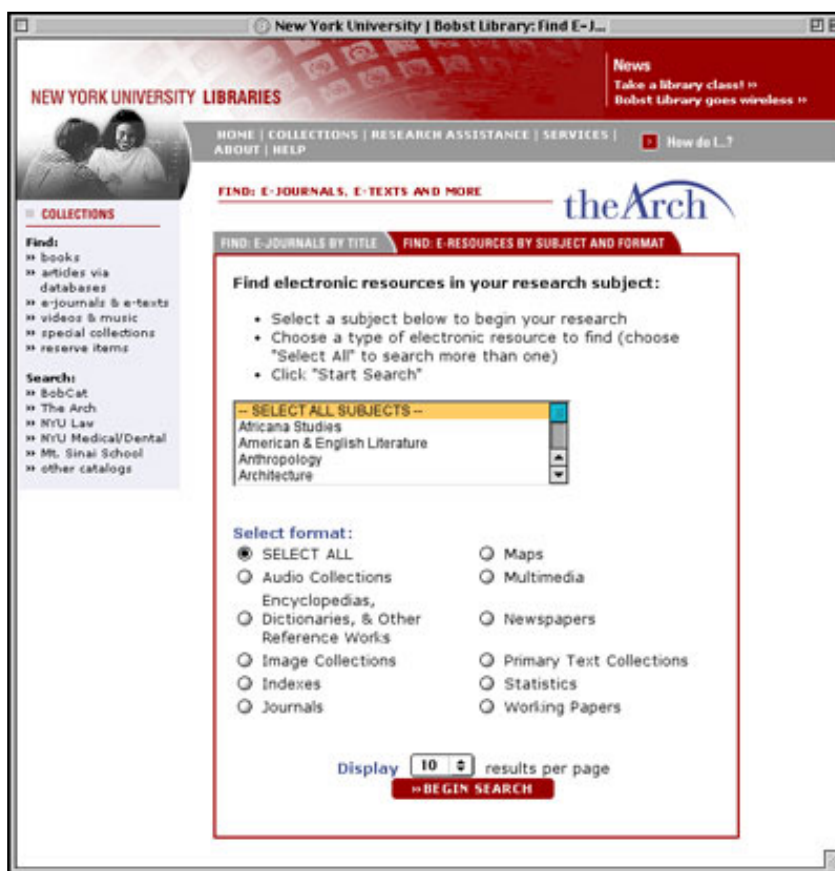


Figure 2. The Arch website, available at [http://library.nyu.edu/collections/find\\_ejournals\\_subject.html](http://library.nyu.edu/collections/find_ejournals_subject.html).

In our effort to make the site more transparent, we also made our "Ask-a-Librarian" service much more prominent. This live-chat and e-mail service has experienced an increase in traffic as a result. Placing the tutorials (e.g., "How to Find an Article") in more relevant locations on the site has also increased their usefulness.

### Subject Pages

Subject web pages provide links to information in a particular discipline. Developed by Subject Specialist librarians, these useful instructional tools provide keys to the many resources available to users in the various subject areas. Depending upon the specific subject, such a page might provide links to tutorials, class websites, Internet resources, and contact information for the Subject Specialist librarian.

### Let Us Know What You Think

We hope you'll find our new site easier to navigate and richer in content. Take a look, and send your comments to <http://library.nyu.edu/about/contact.html>. After all, your comments and feedback guided our redesign, and will continue to do so!

### Author Biography

*Tom McNulty is Librarian for Fine Arts. He can be reached at [tom.mcnulty@nyu.edu](mailto:tom.mcnulty@nyu.edu).*

*Nadaleen Tempelman-Kluit is Instructional Design Librarian at New York University's Libraries. She can be reached at [ntk2@nyu.edu](mailto:ntk2@nyu.edu).*

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F a l l 2 0 0 3 E d i t i o n

Browse the table of contents, or select an option from this menu:



Current Issue



Archives



About Connect

NYU Libraries

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## RedLightGreen Begins Pilot Phase at NYU

By [Dylan Tweney](#)

This fall, NYU is participating in the pilot phase of the RedLightGreen project (<http://www.redlightgreen.com/>), which aims to provide useful, authoritative research information for college students—beyond what library catalogs and Internet search engines can provide.

By taking the large, multi-institution RLG Union Catalog—containing millions of bibliographic descriptions for library collections worldwide—and mining it for conceptual relationships and holdings data, RedLightGreen exposes reliable resources largely hidden from Internet search engines, while using searching and ranking models already familiar to Web users. Library catalogs, by contrast, are usually optimized for tracking books and checking them in and out, not necessarily for finding specific information.

Once students have found the books they want using RedLightGreen, just a few clicks will take them right to the entry for that book in BobCat (NYU's main Libraries catalog). A few more clicks, and RedLightGreen can create a properly formatted bibliography according to MLA, APA, Chicago, or Turabian rules. Of course, the system also provides detailed bibliographic information on any book, including data about editions, contributors, subject classifications, and more.



The main page of the RedLightGreen website, <http://www.redlightgreen.com/>.

## Search, Find, Get

After a year and a half of intensive development, supported generously by The Andrew W. Mellon Foundation, RedLightGreen begins its pilot phase this fall at four institutions: Columbia University, New York University, Swarthmore College, and the University of Minnesota.

Carol Mandel, NYU Dean of Libraries, has been working closely with RLG to implement RedLightGreen at NYU. Says Mandel: "We joined this project because RedLightGreen is the most important effort yet to combine our years of expert library catalog creation with the power of contemporary search engines and the impact of Web delivery. While there is still much to learn from this iterative design and testing process, RedLightGreen has the potential to be the library access catalog we have all been waiting for."

During this phase, the RedLightGreen website will be available to the general public, not just students at the participating pilot institutions.

From the beginning, the development of RedLightGreen has been informed by user testing. The goal is to deliver a website that excels at addressing undergraduates' research needs, without diluting or compromising the quality of their research (a charge sometimes levied at other online search tools, particularly Internet search engines).

The goal of the pilot study, according to RLG program officer Merrilee Proffitt, is to see how well the system works to solve actual student research needs. "We've really focused on using a user-centered design approach," says Proffitt. "We are listening to our users and learning from them. Someone put a note on the whiteboard in our office that we've left up there for months—it says 'We are not our users.' I think this is a good adage to keep in mind while we're in the middle of system development—it

keeps us honest."

By studying the actual usage of RedLightGreen at the four pilot institutions, RLG will be able to tell which features are working, which need more improvement, and what aspects of the system students actually use. To solicit user feedback directly, RLG will also conduct usability studies on the pilot campuses. Informed by data gleaned during the pilot phase, RLG will continue to enhance RedLightGreen.

### **A Gateway to the Library**

Through RedLightGreen's local catalog links, students can check on the status of any book in the search results list, letting them move quickly from initial discovery (finding relevant books) to in-depth research (obtaining and reading those books). Ultimately, this too should improve the quality of student research.

To help spur student usage, RLG is working with library staff at the four pilot institutions, and will also target students directly. RLG will report on the results of the pilot study in early 2004; information can be found on the RLG website, <http://www.rlg.org/redlightgreen/>.

### **More About RedLightGreen**

RedLightGreen searches nearly 130 million records describing library books to put the most widely held, most relevant items near the top of any search results list, which helps users to quickly zero in on the most credible books and authors. If a book appears in dozens of libraries' collections, it's a good bet that the book is considered an important source of information in its subject area: its selection by dozens of librarians is an implicit endorsement. Data mining, provided by Recommend Inc.'s MindServer software, helps students using nonspecialized vocabulary to get better results from the bibliographic data in RedLightGreen.

RedLightGreen supports RLG members' desires to:

- support the discovery of authoritative print resources for college and university students
- create an entry point to the larger range of web and library resources
- increase the presence of library resources on the Web

For more information, see <http://www.rlg.org/redlightgreen/> and <http://www.redlightgreen.com>, or contact Merrilee Proffitt ([mgp@notes.rlg.org](mailto:mgp@notes.rlg.org)).

Text courtesy of RLG.

### **Author Biography**

*Dylan Tweney is a representative of RLG; if you have questions about this article, please contact Merrilee Proffitt at [mgp@notes.rlg.org](mailto:mgp@notes.rlg.org).*

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IT Research Resources

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Current Issue

**Gartner Research Now Available at NYU**



Archives

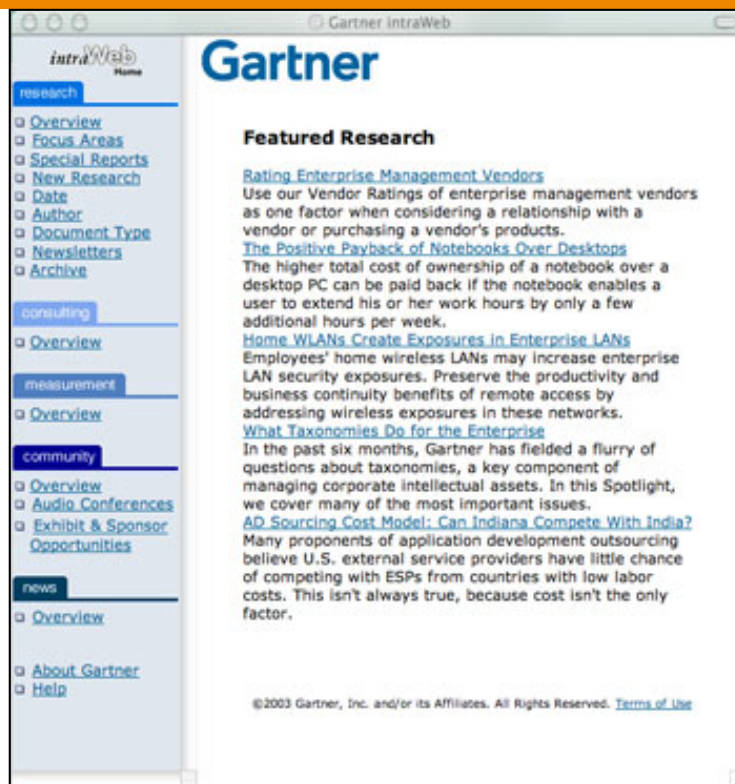
By **ITS Administrative Computing Services**

With more than 20 years of experience identifying and analyzing the trends and technologies that have shaped the course of business, Gartner, Inc. provides research and advisory services to over 11,000 organizations worldwide, including NYU's Information Technology Services.



About Connect

Now ITS is making much of the same information available to NYU faculty, students, staff, and administrators through a subscription to the Gartner intraWeb acquired by ITS. This searchable, easy-to-use online service delivers a wealth of strategic IT information, including Gartner Research and Advisory Services.



The main page of the Gartner intraWeb.

### Accessing the intraWeb

Interested NYU faculty, staff, administrators, and students can access the Gartner Research intraWeb through NYUHome (<http://home.nyu.edu/>) and through the NYU Libraries' website at [http://library.nyu.edu/collections/find\\_articles.html](http://library.nyu.edu/collections/find_articles.html).

In NYUHome, click the Research tab near the top right corner of the screen. In the "Library" channel on the page that opens, click on the link for "Gartner Reports" under the "Article Search" subheading.

We hope you find this new resource helpful and interesting. Please send your feedback or questions about the Gartner intraWeb to [its.pubs@nyu.edu](mailto:its.pubs@nyu.edu).

### About Gartner Research & Advisory Services

Gartner's Research & Advisory services have long been recognized as the definitive source for objective technology thought leadership. Gartner employs 650 analysts from around the world who have an average tenure of 10-15 years in technology. Many Gartner analysts are former CIOs and all have extensive previous business technology expertise. In the United States, Gartner analysts are often called before the U.S. Congress to discuss the critical business and technology issues that are driving today's economy. Gartner has the most comprehensive body of global research that reports on and analyzes the technologies that drive business and organizational success.

The more than 200 research topics addressed on the intraWeb include customer relationship management (CRM), business-to-business e-commerce, supply chain management, wireless, emerging technologies, security, IT services, e-business, and IT spending and strategies. For

additional information about Gartner Inc., please visit <http://www.gartner.com/>.

(Adapted from the Gartner website: <http://www.gartner.com/>.)

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### **Author Biography**

*ITS Administrative Computing Services is a division within NYU's Information Technology Services. Please send your questions or comments about this article to [its.pubs@nyu.edu](mailto:its.pubs@nyu.edu).*

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## Information Technology at NYU



Search This Site

F a l l 2 0 0 3 E d i t i o n

Browse the table of contents, or select an option from this menu:



Current Issue



Archives



About Connect

I n s t r u c t i o n a l T e c h n o l o g y

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### A Taste of New Instructional Technologies Available at the ITS Multimedia Lab

By [Robyn Berland](#)

With the implementation of OS X on the Apple Macintosh platform in the ITS Multimedia Lab and the ITS hands-on classrooms, new and improved instructional software applications have been added to our software suite. These applications provide tools that have potential for enriching the hands-on computer-based learning experience. NYU faculty are invited to experiment with these tools and to evaluate their effectiveness in supporting their individual teaching styles.

#### Enhance Your Class with SMARTBoard Technology

The wired classroom in the ITS Multimedia Lab contains an instructor's station with a SMARTBoard Interactive Whiteboard (see Figure 1) at the front of the rectangular room. The 25 student computer workstations line the remaining perimeter of the room. Faculty can manage the classroom in accordance with their individual instructional styles and the requirements of the course materials being presented.

For example, students can be placed at the front of the room (close to the presentation) during a lecture, brought to the center of the room for active discussion, and returned to their computers to apply the current lesson. Of course, students can also remain at their workstations throughout the class. Student presentations can be given at the front of the room on the SMARTBoard or at the individual workstations, kiosk-style.

The rear projection SMARTBoard has features that are helpful in an instructional environment. The touch screen technology frees the instructor from the mouse and to some degree the keyboard, and places the instructor and the presentation within the same line of sight for the students.

As ideas are presented and discussed, annotations can be superimposed on a computer image using electronic ink. The presentation, along with annotations and information from screen captures, can be saved in HTML or PDF format and uploaded to the course's Blackboard shell for student review at a later time. Presentations are preserved using the SMARTBoard Notebook tool. The Notebook can also be used in advance of a lecture to prepare materials for presentation.

Students enjoy using the interactive board, as well. For instance, students using Geometer's Sketchpad in the ITS Multimedia Lab classroom draw and manipulate objects on the board to demonstrate and experiment with concepts.



Figure 1. The SMARTBoard Interactive Whiteboard.

### Connect Computers Using Apple Remote Desktop

Another tool available at the Multimedia Lab is the Apple Remote Desktop. Developed by Apple Computer as a lab management tool, this software can be used to manage student workstations during class meetings. Using an easy-to-understand interface (shown in Figures 2 and 3), instructors can share selected computer displays, including their own, with any or all of the student workstations.

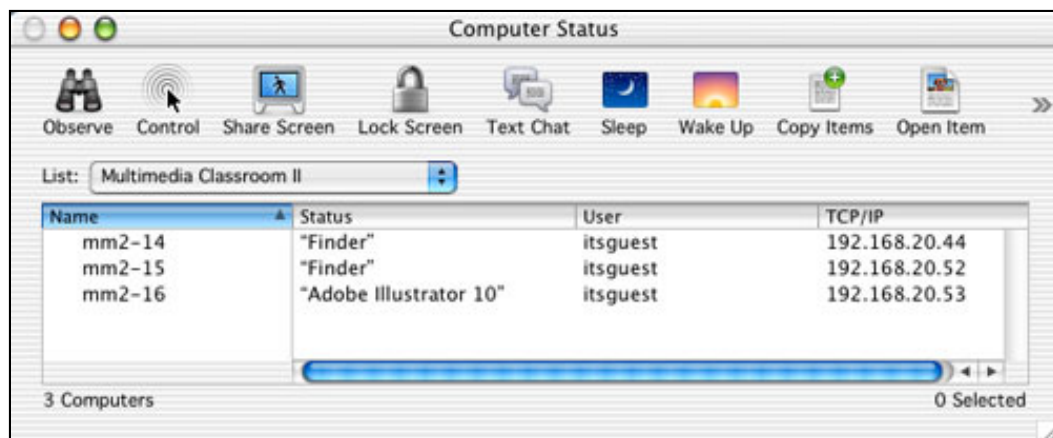


Figure 2. The Apple Remote Desktop control panel.

Student work can be displayed on the SMARTBoard or on each student's computer without the need to transfer files. While students are working at their individual workstations, the instructor can use the Control, Observe, and Text Chat options to guide students through complex assignments. Last, but not least, there is a Lock Screen option that can be used to focus students' attention on the instructor when important information is being communicated.

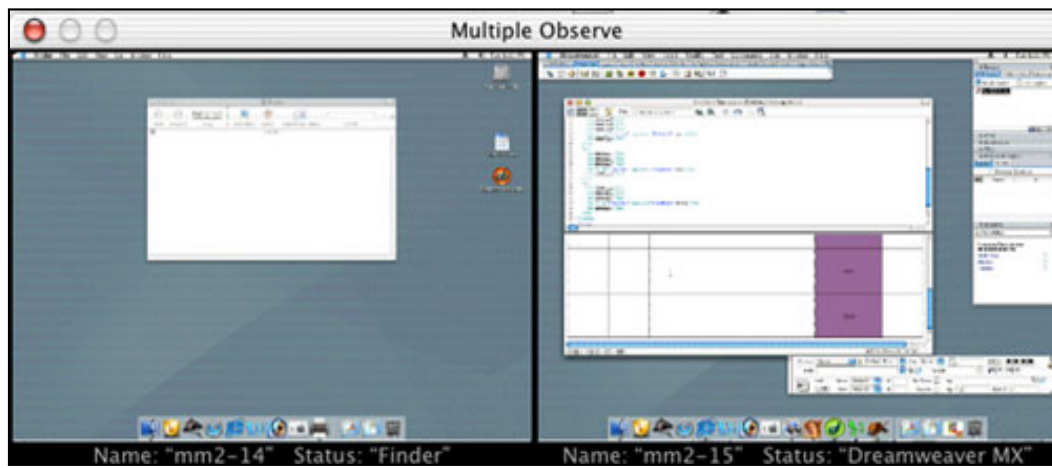


Figure 3. The Apple Remote Desktop in action.

### iChatAV—The Next-Generation Instant Messenger

A new technology of note to faculty is iChatAV, an Instant Messaging tool. Available in OS X, iChatAV incorporates audio and video, making it possible for people to see and hear each other while they chat (see Figure 4). We have installed this software to give instructors and students an opportunity to explore the possible applications of this versatile technology in the classroom.

During the O'Reilly Conference on Emerging Technologies which I recently attended, I was amazed to observe the steady, on-topic conversation occurring among attendees during presentations using iChatAV. This tool has great potential for facilitating communication among students in the wired classroom setting and faculty in teacher conferences, and in a variety of other educational scenarios.

### Getting Started

NYU faculty interested in using or experimenting with these and other tools available at the ITS Multimedia Lab are invited to visit the Lab at 35 West 4th Street, open Monday through Friday from 8:30 a. m. to 11:30 p.m., and on Saturday from 8:30 a.m. to 5:30 p.m. (closed on Sundays).



Figure 4. A sample iChatAV session.

To schedule a class in an ITS wired classroom, visit <http://www.nyu.edu/its/classrooms/> and complete the online application form. If you have questions about any of the technologies described in this article, please call Robyn Berland at 1-212-998-3396.

## Author Biography

*Robyn Berland is the Computer Lab Manager of the ITS Multimedia Lab at 35 West 4th Street, 2nd Floor. She can be reached at [robyn.berland@nyu.edu](mailto:robyn.berland@nyu.edu)*

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# Connect

## Information Technology at NYU



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F a l l 2 0 0 3 E d i t i o n

Browse the table of contents, or select an option from this menu:



Current Issue



Archives



About Connect

I n s t r u c t i o n a l T e c h n o l o g y

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### ITS and NYU Libraries Orientation for New Faculty

By [Kate Monahan](#)

To help raise awareness of the many services available to NYU faculty, ITS and the NYU Libraries recently co-hosted an information session for incoming instructors. Held in the Avery Fisher Center at Bobst Library on September 19, 2003, the orientation was hosted by Lucinda Covert-Vail, Director of Public Services at NYU's Division of Libraries, and Vincent Doogan, Director of ITS Academic Computing Services at NYU.

After welcoming the attendees, Covert-Vail distributed copies of the Services for Faculty and Student Guide brochures that the Libraries and ITS co-produce. She recommended that all faculty use them as a helpful overview of the ways in which the two divisions support teaching, learning, and research at NYU. She then began a tour of the Libraries' newly-redesigned website (<http://library.nyu.edu>), which she opened on the room's laptop computer and projection screen.

As she pointed out the many resources linked from the site's main page, Covert-Vail explained that the Libraries "have been making huge strides in the services you can access online, from your desk, your office, and at home". Clicking the "books" link brought us to the gateway for searching the NYU Libraries' catalogs (BobCat, Julius, WebCat, and MedCat) and those of other libraries: [http://library.nyu.edu/collections/find\\_books.html](http://library.nyu.edu/collections/find_books.html).

There are also more than 12,000 e-journals available through the website, with new materials being added on a regular basis. These materials are easy to access using a wide range of databases ([http://library.nyu.edu/collections/find\\_articles.html](http://library.nyu.edu/collections/find_articles.html)) or The Arch, the Libraries' new gateway to electronic resources (<http://library.nyu.edu/collections/arch.html>). See the article [NYU Libraries New Website Unveiled](#) in this issue for more information.

Beyond access to library materials, faculty can also use the website to put print and electronic materials on reserve for students, recommend that new journal subscriptions or copies of texts be purchased by the Libraries, and recall or renew materials.

After encouraging each faculty member to further explore the website on their own, Covert-Vail then discussed the ways in which faculty can make the most of Libraries resources. Each faculty member has an individual Subject Specialist Librarian with discipline-specific expertise who can "work with you to build collections, provide bibliographic instruction to your class, create assignments, and assist you with Libraries resources". A list of Subject Specialists can be found at [http://library.nyu.edu/research/lib\\_arc.html](http://library.nyu.edu/research/lib_arc.html).

Turning our attention back to the website, Covert-Vail showed us the online Ask-a-Librarian service (<http://library.nyu.edu/ask/>), which offers both chat reference (real-time online discussion with a Librarian) and e-mail assistance to all NYU faculty, staff and students. Before turning the podium over to Vincent Doogan to discuss ITS services, she also pointed out the collection of helpful online tutorials available at <http://library.nyu.edu/research/tutorials/>.

Doogan began his portion of the talk by walking us through the ITS website (<http://www.nyu.edu/its/>), encouraging faculty to pay particular attention to the "Instruction and Research" menu. This area contains links to such services as the Blackboard online learning system, broadcasting and Internet2, wired classroom and multimedia facilities, and discipline-specific IT services.

He also pointed out the frequently asked questions (<http://www.nyu.edu/its/faq/>) and computer security (<http://www.nyu.edu/its/security/>) sections of the site as helpful resources, and showed us that the Faculty page contains a handy list of faculty-specific ITS links (<http://www.nyu.edu/its/faculty.html>).

Doogan then opened NYUHome (<http://home.nyu.edu>), the University's portal to a wide variety of electronic resources and services. In the "Home" tab, he pointed out the channel offering convenient access to NYU Forums, threaded discussion lists that can be used by faculty to interact with their students (described in more detail at <http://www.nyu.edu/its/forums.html>). In the "Research" tab, he demonstrated how many Libraries resources can be quickly accessed through the Library channel.

In the "Academics" tab, Doogan pointed out the "Classes" channel, explaining that it contains links to each faculty member's Blackboard classes. A Blackboard class can be created as a supplement for each course a faculty member instructs, and is "an easy interface for uploading and accessing content and integrated communication tools". More information, including instructions on how to request a course and use the software, is available at <http://www.nyu.edu/its/blackboard/>. (Also see the article [What's New in NYU Blackboard?](#) in this issue.

He continued with an overview of the Academic Computing Services department (ACS) within ITS. ACS offers a variety of useful faculty-specific resources, including the Studio for Digital Projects and Research on the second floor of Bobst Library, which is jointly operated by ITS and the NYU Libraries, and the ITS Faculty Technology Center (FTC) on the second floor of 35 West 4th Street, a facility which is "oriented toward the instructional, digitization and training needs of faculty".

Doogan recommended that faculty members come to the FTC to discuss projects and take advantage of the "drop-in access to computers and scanners, and a cadre

of instructional technologists who provide training and assistance in creating digitally-formatted content".

Doogan closed with a description of the ITS computer labs and the wired classroom facilities available to faculty. A video highlighted NYU's new classroom complex at 194 Mercer Street and the ITS hands-on computer classrooms, which offer computers for student use, SMARTBoard technology, wireless access, and on-site staffing by ITS. Additional information is available on the ITS website at <http://www.nyu.edu/its/classrooms/>.

This orientation was not only useful to new faculty, but also a helpful reminder to all instructors that there is a wide range of services available to enhance teaching at NYU, and a variety of staff to keep you informed and help you make the most of these resources. For more information about Libraries services, please contact your department's Subject Specialist (see above for details); for ITS services, contact the ITS Faculty Technology Center at 1-212-998-3044 or [its.ftc@nyu.edu](mailto:its.ftc@nyu.edu).

For copies of the publications mentioned in this article, please visit the ITS Client Services Center at 10 Astor Place or the Bobst ERC, 70 Washington Square South, B-level. You can also visit the ITS Publications website (<http://www.nyu.edu/its/pubs/>) to access electronic versions, or contact the ITS Publications Group at [its.pubs@nyu.edu](mailto:its.pubs@nyu.edu) to request multiple print copies of most publications.

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### Author Biography

*Connect Editor Kate Monahan is a Technical Writer within the Publications Group of ITS Client Services. She can be reached at [kate@nyu.edu](mailto:kate@nyu.edu)*

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# Connect

## Information Technology at NYU



Search This Site

F a l l 2 0 0 3 E d i t i o n

Browse the table of contents, or select an option from this menu:



Current Issue



Archives



About Connect

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### What's New in NYU Blackboard?

By **Ethan Ehrenberg**

This fall, Information Technology Services (ITS) upgraded the NYU Blackboard system to version 6.0. For those who do not already know, Blackboard is the primary course management software system used by almost every school at the University, and on many campuses across the U.S. and worldwide.

Blackboard allows faculty to distribute course content and organize out-of-class communication using the Internet. The system combines many online tools and resources, including e-mail, chat, streaming video, and content pages, and helps faculty organize them for individual academic courses using a simple web template.

By incorporating a wide variety of web-based technologies while requiring virtually no technical expertise, Blackboard empowers instructors to significantly enhance learning through use of the Web without the usual technical barriers to doing so. Over the past several years, ITS Faculty Technology Center staff have introduced a great many NYU faculty members to Blackboard. As we often tell first-time users, "If you can put an attachment in e-mail, you can use Blackboard." Recent usability numbers seem to testify to the system's powerful combination of tools and relative ease-of-use. At last count, there were over 2,700 individual NYU class sections using Blackboard, representing approximately 2,000 instructors and 30,000 students.

Ease-of-use notwithstanding, Blackboard is actually a very sophisticated learning tool. Version 6.0 of the software offers expanded features and adds customizability over previous versions, making it an even more effective and flexible instructional tool.

Some of the more significant enhancements are the ability to completely customize the main navigational menu, the ability to link internally to other content areas, folders, and items, and the ability to copy course material from one course to another under the same instructor. The customizable Course Menu allows instructors to name areas as they please (e.g., "Current Event Readings" instead of "Course Documents"), choose between two presentational layout designs (buttons or text),

and link to specific URLs, course areas, or tools.

With the Course Link feature, instructors can add links between different areas or tools within a given course. This feature can cut down on uploading time since it is now only necessary to upload an item once, regardless of how many times it is linked in Blackboard, and can expand organizational possibilities (for example, by including a Reference area that combines content links from various document sections).

Also, with the Course Copy feature, instructors teaching multiple Blackboard courses can copy content between these different courses. This has the potential not only to reduce uploading time, but, perhaps more significantly, to facilitate content sharing and encourage collaboration across courses, colleagues, and entire departments.

These improvements are accompanied by a host of others, such as new standard features (e.g., the inclusion of math and statistics equation editors in all content, assessment, and collaboration areas), additional flexibility (e.g., the ability to link to content, including tests, URLs, and items in all content areas) and technology upgrades (e.g., expanded Virtual Classroom and Gradebook functionality). The many new features and improvements that have been added to Blackboard version 6.0 will be particularly useful to intermediate and advanced users, without sacrificing any of the straightforwardness of the original interface, which makes the system so accessible to beginners.

### **Initial Glitches—Solved!**

As is often the case when a large, complex application system is being modified, the upgrade to version 6.0 was not achieved without some initial difficulties and inconveniences. Most significant was the noticeably slow performance of the new system when it was first deployed.

In response, ITS, and the staff of eServices in particular, worked with Blackboard, Inc. to locate the cause of the problem and then to devise a solution. Within a few weeks, the system slow-downs were cured, resulting in a very fast, reliable NYU Blackboard upgrade.

### **Online Help, Training & Support**

In addition to the system upgrade, ITS is also redesigning the NYU Blackboard help and support options, with several new initiatives spearheaded by the Faculty Technology Center (FTC). The first of these is a completely new style of training workshop. With the view that people tend to learn software applications most effectively by doing rather than watching, the FTC has re-tooled all of its NYU Blackboard workshops to be "hands-on", with participants actually working on their own course sites during the session.

These workshops take advantage of the new state-of-the-art, hands-on classroom facilities located at NYU's new 194 Mercer Street complex. The training sessions introduce newcomers and returning NYU Blackboard "instructors" to the many features and tools of Blackboard v.6 and review some "Best Practice" strategies for organizing courses and course content. Attendees then complete several key Blackboard tasks within the same session, with technical assistants standing by to provide support.

An important component of these workshops is the use of a model Blackboard course generated by the FTC, which serves as an example of how to use NYU Blackboard and contains a wealth of reference articles and information about using the system to enhance learning. The course can be accessed by following the instructions at <http://www.nyu.edu/its/ftc/supported/links/blackboard/about/demo.html>.

During the first part of the Fall 2003 semester, the FTC offered these hands-on workshops for both beginners and experienced users of Blackboard, focusing on the new enhancements of version 6.0. Currently, the FTC is in the process of scheduling more advanced topics and targeted sessions for specific departments. Anyone interested in arranging a workshop session should visit the ITS Classes page at <http://www.nyu.edu/its/classes/> and follow the instructions.

The other major NYU Blackboard help initiative involves a complete overhaul of the online help and support options. The first step in this renovation was to revise and expand the information in the Blackboard section of the ITS "FAQs and How To's" web pages to reflect the new features of version 6.0 and to develop an area for Student FAQ's. These pages can be found at <http://www.nyu.edu/its/faq/blackboard/> or by simply clicking the Help button at the top of any web page within NYU Blackboard. There are plans underway to work with ITS Client Services to transform this online help area into a more searchable troubleshooting resource, featuring a table of contents, an index, and a keyword search capability.

The FTC is also expanding its own NYU Blackboard online help for faculty at <http://www.nyu.edu/its/ftc/blackboard/>, as part of a larger site redesign. With its upcoming release, this help area will include new Quick Start Guides, an introductory tour, and a brand new tutorial section, which will walk Blackboard novices through a sequential learning path from beginner to intermediate, with easy-to-follow instructions, screenshots, helpful hints, and desktop video demonstrations of each step.

There is also a reference section with articles and best practice advice, contact information for further assistance, links to student help resources, and much more. This area will continue to be enhanced throughout the coming year.

All of these efforts are part of an overall ITS strategy to support systems that enable the NYU community not only to use new technologies, but to use them well, and to incorporate systems such as NYU Blackboard in a way that empowers good teaching and has a lasting positive effect on learning. We are always interested in your feedback; please share your comments with us by sending e-mail to [its.ftc@nyu.edu](mailto:its.ftc@nyu.edu).

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### **Author Biography**

*Ethan Ehrenberg is an Instructional Technology Specialist at the ITS Faculty Technology Center. He can be reached at [ethan.ehrenberg@nyu.edu](mailto:ethan.ehrenberg@nyu.edu).*

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Archives



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Computer Security Corner

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## Tips on Securing Your Windows Computer in Insecure Times

By **Tracey Losco**

It seems as though every time you turn on the radio or television these days you hear about a new computer worm or virus. Most of these programs target Windows machines—the most popular platform—and infections can spread quickly and cause a great deal of damage. This article outlines a few simple steps that every person running a Windows computer should take to protect his or her computer against infection.

### 1. Set an Administrator Password

The first, and probably most important, precaution you can take is to set an Administrator password on your machine if you are running any of the most current Windows systems (e.g., XP, ME, 2000). If you don't, you're making your computer very vulnerable indeed, for there are multiple worms and viruses that can exploit this single vulnerability.

Running a Windows system without having set an Administrator password is comparable to leaving the door to your house unlocked: anyone can just come in and rummage through your things, and potentially could even move right in. When the Administrator password has not been set, someone else can log in to your computer, use it, copy files to it, and even use your computer to launch attacks against other computers. Setting the Administrator password is like locking your door against these intruders.

To set your administrator password:

- Press "Ctrl+Alt+Delete" on your keyboard.
- Click on the "Change Password" button.
- Type "Administrator" in the "User Name" box.
- Select "this computer" in the "Log on to:" drop-down box.
- In the "New password:" box, type a secure password.

If you do not see a box appear with this option when you press "Ctrl+Alt+Delete", then you can access this same section by doing the following:

- Go to the "Start" menu.
- Click on the "Control Panel" button.
- Double click on the "User Accounts" button.
- Click on the account name for which you want to set the password.
- Click on the "Change my password" selection.
- In the "Type a new password" box, type in a secure password.
- Retype the password in the "Type the new password again to confirm" box.
- Click on the "Change Password" button.

## 2. Apply All Critical Patches from Microsoft

Another important step in securing your Windows machine is to keep up-to-date with any critical patches that Microsoft releases. Microsoft and other manufacturers release these updates, which run on your computer to repair newly found vulnerabilities in their software. In the past few months, Microsoft has released a number of critical patches for some serious vulnerabilities.

We strongly recommend that you configure Microsoft's "Windows Update" program to automatically check for new patches. To do this:

- Connect your computer to the Internet. Go to the lower left-hand corner of your screen and click on "Start", to open the Start menu.
- Choose "Windows Update" from this menu. If "Windows Update" is not included in this list, click on "All Programs"; you should now see "Windows Update".
- Next, click on "Windows Update", which will open a new window. On the right-hand side of the new window, click on the link that reads, "Scan for updates".
- When the scan is complete (it will take a few seconds), a list will appear on the left-hand side of your screen. Click on the link for "Critical Updates and Service Packs". This will show you a list of all the patches you need to install; we recommend that you do not run more than five at a time.
- If you are installing patches on a laptop computer, be certain that your machine has plenty of battery power, or is plugged in before you begin.
- Although it may take some time to install the patches, it is very important to use them all.
- Once the installation is complete, you will be asked to restart your computer. After doing so, go back to the beginning and start the process over again. Keep doing this until no critical updates appear when you select "Scan for updates".

Once your computer is completely up-to-date with all of the Critical Updates, make a point of checking Windows Update daily, or you can set Windows Update to automatically download and install any newly released patches. See the following Microsoft article for a complete step-by-step guide on how to do this for your specific operating system: <http://www.microsoft.com/security/protect/>.

## 3. Install and Run Anti-virus Software

Another key layer of protection for your machine is anti-virus software. This type of software runs on your machine, constantly monitoring for any virus or worm-type activity. If this type of activity is detected, you will receive a warning from the program with a request to either clean or delete the infected files.

Through a site-license acquired by ITS, NYU provides Symantec Anti-Virus software to qualified members of the University community at no cost to the individual. You can download this package from the Software channel in the Files tab of NYUHome,

or from the latest NYU-NET CD, available at the ITS Client Services Center, 10 Astor Place, 4th floor (see <http://www.nyu.edu/its/csc.html> for hours).

Once you have installed anti-virus software, it is vitally important that you keep your virus definitions up-to-date. Anti-virus programs use these definitions to recognize new viruses and worms—without the definitions, your software can't catch and repair them. By the time that you have installed any type of anti-virus software on your machine it is most likely already out of date, so be sure to check for updates immediately after installing the software.

After that, you should check for new definitions daily; you can configure most anti-virus programs to check for and download these updates automatically. Remember: your anti-virus software is only as useful as it is up-to-date.

#### **4. Keep in the Know!**

ITS will post virus notifications to the Security channel within NYUHome. Keep an eye on this channel for up-to-date security news. Also, check for virus alerts and instructions on how to download specific virus cleaning tools at the ITS Security website: <http://www.nyu.edu/its/security/virus.html>.

#### **Additional Information**

These are the four simple steps that every person who uses a Windows computer should take to help secure their machine. For more advanced protection, you may want to look into the many configuration guides and tools offered by Microsoft and the Center for Internet Security. To see a list of all of Microsoft's Security Tools and Checklists, click on the link for Security at <http://www.microsoft.com/technet/>. The Center for Internet Security can be found at <http://www.cisecurity.org>.

If you have any questions, contact the ITS Client Services Center at 1-212-998-3333 or [its.clientservices@nyu.edu](mailto:its.clientservices@nyu.edu). Thank you for helping to keep NYU's network safe!

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#### **Author Biography**

*Tracey Losco is a Network Security Analyst in ITS Network Services. She can be reached at [tracey.losco@nyu.edu](mailto:tracey.losco@nyu.edu).*

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Current Issue

### Mapping for Social Change

By [René Francisco Poitevin](#)



Archives

Mapping for Social Change, a new course at NYU's Gallatin School of Individualized Study, brings together public participation GIS, service learning, and community organizing. Among the unique features of this course is the fact that it is the only undergraduate GIS course at NYU. Previously, the only way to learn GIS at NYU was through graduate courses.



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Mapping for Social Change teaches GIS in collaboration with community organizations addressing real issues. The underlying concept is that by teaching how to do spatial analysis while working on actual community issues, we help increase the capacity of these organizations to advocate on behalf of their membership at the same time that we help students learn GIS.

Last spring, students worked with groups and agencies addressing a variety of issues ranging from voter registration and union campaigns to low income housing. Thanks to the active support of the Dean of the Gallatin School, Mapping for Social Change was able to successfully attract four community members to participate in this course as if they were regular NYU students.

The idea behind this approach is that, by bringing their particular expertise and knowledge into the classroom, community members make an invaluable contribution to students' thinking about how GIS projects should be designed. At the same time, this strategy helps community agencies increase their capacity to do their own in-house GIS analysis by creating a core of GIS-trained community members.

Next spring, students enrolled in this class will learn the ins-and-outs of GIS while supporting the groundbreaking research currently taking place at the Center for the Practice and Study of Community Problem Solving at the NYU School of Law.

If you or someone you know is interested in the intersection of GIS and community issues, we encourage you to contact us for more information; please send e-mail to René Poitevin at [rfpoitevin@nyu.edu](mailto:rfpoitevin@nyu.edu).

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### **Author Biography**

*René Francisco Poitevin is an Assistant Professor at the Gallatin School of Individualized Study. This year he is teaching Mapping for Social Change and Gentrification and Its Discontents. He also coordinates the Community Learning Initiative at Gallatin. He can be reached at [rfpoitevin@nyu.edu](mailto:rfpoitevin@nyu.edu).*

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Current Issue

## Friday GIS Clinics



Archives

By **Frank LoPresti**

This past spring, ITS Academic Computing Services' Social Sciences, Statistics, and Mapping Group started offering a Geographic Information Systems (GIS) Clinic on Fridays. "Bring your own GIS issues to this forum. Meet some GIS users at NYU. All interested NYU researchers are invited to attend," read the notices we sent to our Statistics Forum subscribers.



About Connect

The key players in the GIS Clinic come from the public sector, the software industry, and academia. Pre-dating the Clinic was a mutually beneficial mapping collaboration that the Social Sciences, Statistics, and Mapping Group had formed with Antonio Lopez, a former student employee who is now a Senior Planner/GIS Analyst for New York City's Metropolitan Transit Authority. Mr. Lopez, a graduate of NYU's Wagner Graduate School of Public Service, is interested in keeping the GIS tools and applications at NYU state-of-the-art. His regular visits to the Statistics and Mapping Computational Lab to guide us on geocoding software issues, NYC map updates, and other matters are what eventually led us to formalize the meeting into a weekly public event.

Professor René Francisco Poitevin of NYU's Gallatin School of Individualized Study quickly became the Clinic's unofficial faculty sponsor. He, along with Professor Zvia Naphtali of the Wagner Graduate School of Public Service, has suggested topics for discussion and contributed to many of the presentations we have offered. They are part of a small group of faculty who teach and use GIS at NYU.

ESRI (<http://www.esri.com>), a GIS software company with a long track record in this exciting field, has also joined the growing Clinic partnership. ArcGIS, their mapping product, is NYU's high-end GIS software package. Their representative, Aisha Jenkins, regularly attends the GIS Clinic to meet with researchers and help them organize their GIS projects. She frequently calls upon ESRI's technical staff to help evaluate new projects.

A variety of interesting issues were discussed during the spring 2003 Clinics. For

example, two researchers—Ann Rivera of NYU's Center for Community Research and Action at the Faculty of Arts and Science, who had data representing youth services' and facilities' locations in Brooklyn, and Professor Gerald Lopez of NYU's Law Clinic, who had data representing legal facilities' locations in Brooklyn—needed to create maps on which important locations would be highlighted.

Working maps—digital or paper—are layered; picture a zoning office in which there are old paper "lot" maps with plastic overlays providing other information, such as areas of different usage. Similarly, putting a list of facilities onto a digital map (as Rivera and Lopez needed to do) involves the creation of a layer of points superimposed on a street map. The facilities' addresses must be plotted along streets, a process that almost always encounters problems like construction issues or the misspelling of street names. Fixing these discrepancies requires interactive geocoding sessions. Geocoding software that meets this need was demonstrated by ESRI at a Friday Clinic, and then installed and maintained on one of our computers by Mr. Lopez. It operates like a spell checker, suggesting matches for mismatches.

Since researchers who attended the Clinic were also interested in the "web publishing" of maps, Ms. Jenkins of ESRI hosted a presentation on their product Internet Map Server (IMS) at one Friday session. IMS provides the technology for developing not just maps, but also web-based mapping applications. Researchers learned that the software allows them to create applications to answer map-related questions (e.g., "Where is the closest youth service to my apartment?" "Which legal services are near a certain bus route?"), and then to make the application work on a stand-alone computer, which may involve spatial analysis tools available in GIS and Visual Basic. Finally, IMS can be used to publish the applications on the Web.

If these and other GIS issues are of interest to you, we encourage you to attend our Fall 2003 Friday GIS Clinics, which take place each Friday at the ITS Statistics and Mapping Computational Lab, 75 Third Avenue, level C-3; please bring along your research needs. For information on the meeting time and topic, subscribe to the NYU Forum "Statistics" (instructions below) or contact Frank LoPresti ([frank.lopresti@nyu.edu](mailto:frank.lopresti@nyu.edu) or 1-212-998-3398).

### **Additional Information**

#### **The NYU Statistics Forum**

The NYU Statistics Forum mentioned in this article is an e-mail discussion list that notifies subscribers of ITS Academic Computing Services' Social Sciences, Statistics and Mapping Group events and related software information. To subscribe to the Statistics Forum, log into NYUHome (<http://home.nyu.edu>), and find the "Forums" channel on the main "Home" screen. Click on the "Subscribe to an NYU Forum" link at the bottom of the channel. In the alphabetical list of Forums that appears, check the box next to "Statistics" (ITS/ACS Statistics and GIS Group). You will then be added to the mailing list. This list is open, which means that anyone can request to join.

#### **GIS Available at ITS**

ArcGIS and ArcInfo, from ESRI, are the high-end GIS software products used at NYU. ArcGIS is available at the ITS Tisch Hall and 14 Washington Place computer labs. Both ArcGIS and ArcInfo run at the ITS Statistics and Mapping Computational Lab at the ITS Third Avenue North Computer Lab.\*

Another mapping system available at NYU is MapInfo (<http://www.mapinfo.com/>), which has fewer features, but an easier learning curve. ITS has a site license for MapInfo and may also distribute copies to researchers who are developing courses. While enrolled in courses using MapInfo, students are also allowed to run the software on their own computers. MapInfo is available at NYU at the ITS 14

Washington Pl. Lab, Tisch Hall Lab, and Third Ave. North Lab.\*

GRASS, one of the earliest GIS tool sets, is still very powerful, with a large library of routines. Created by the Army Corps of Engineers, this software is open source, and is available for download at <http://grass.itc.it/>. GRASS is running on many of the Linux computers at the Statistics and Mapping Computational Lab in the ITS Third Ave. North Lab.\* For additional information about using any of these GIS packages, please contact Frank LoPresti ([frank.lopresti@nyu.edu](mailto:frank.lopresti@nyu.edu) or 1-212-998-3398).

\* See the ITS Computer Labs website at <http://www.nyu.edu/its/labs/> for locations and hours.

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### **Author Biography**

*Frank LoPresti heads the Social Sciences, Statistics & Mapping Group of ITS Academic Computing Services. He can be reached at [frank.lopresti@nyu.edu](mailto:frank.lopresti@nyu.edu).*

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Current Issue



Archives



About Connect

## Exploring GIS: A Student's Experience

By **Benita Liao**

My introduction to Geographical Information Systems (GIS) began this past July, when I started working with Drs. Michael Marmor and Phillippe Nyambi of NYU's School of Medicine on a study of the transmission of HIV/AIDS in Cameroon. My job was to plot information on maps about the villages that were being studied and the spread of HIV/AIDS in the area, so that various patterns might be recognized. I knew nothing about GIS before taking this job, so although I knew what the eventual goal of my project was, I had no idea as to how I could achieve it.

On my first day, I walked into the ITS Third Avenue North computer lab resigning myself to the fact that I was going to be spending a good part of my summer indoors and underground. I was introduced to GIS by Frank LoPresti, head of the ITS Social Sciences, Statistics & Mapping Group, who signed me up for two online classes offered by the ESRI virtual campus. (1)

ESRI is the company that makes ArcGIS, the mapping program that I was going to use. To my surprise, they offered upwards of fifty different types of online courses. Even more surprising to me was the fact that every time I signed onto the virtual campus website, a little counter on the right side of the screen told me that over 200,000 users from 180 countries were currently using the program. I had no idea that Mapping was such a large field. In actuality, programs such as ArcGIS are used daily by researchers in the health field to chart the spread of diseases, by marketing researchers to map out the location of a product's customer base, and by police officials to target crime-heavy areas, among innumerable other uses.

To familiarize myself with ArcGIS, I took two introductory ESRI classes: Creating, Editing, and Managing Geodatabases for ArcGIS 8.2 and Working with Rasters in ArcGIS. Having never taken an online class before, I did not know what to expect. As it turns out, the information I learned was useful and interesting, but I had trouble staying focused for hours at a time.

At the end of each lesson, I was assigned an exercise to complete in ArcMap and ArcCatalog, two of the many components of ArcGIS. Although these exercises were the key to actually learning the software, they were frustrating at times. For example, sometimes I would carefully follow their instructions point by point, but I simply could not generate the intended map. Thus, a drawback to using these online classes alone is that they do not provide an online teacher who can assist you when you encounter trouble.

Once I had completed these courses and learned the basics of ArcGIS, I was sent to websites that provided free GIS data for different parts of the map, such as boundary lines (for countries), roads, railroads, populated places, etc. There, I was able to download the data for Cameroon and all of its surrounding countries.

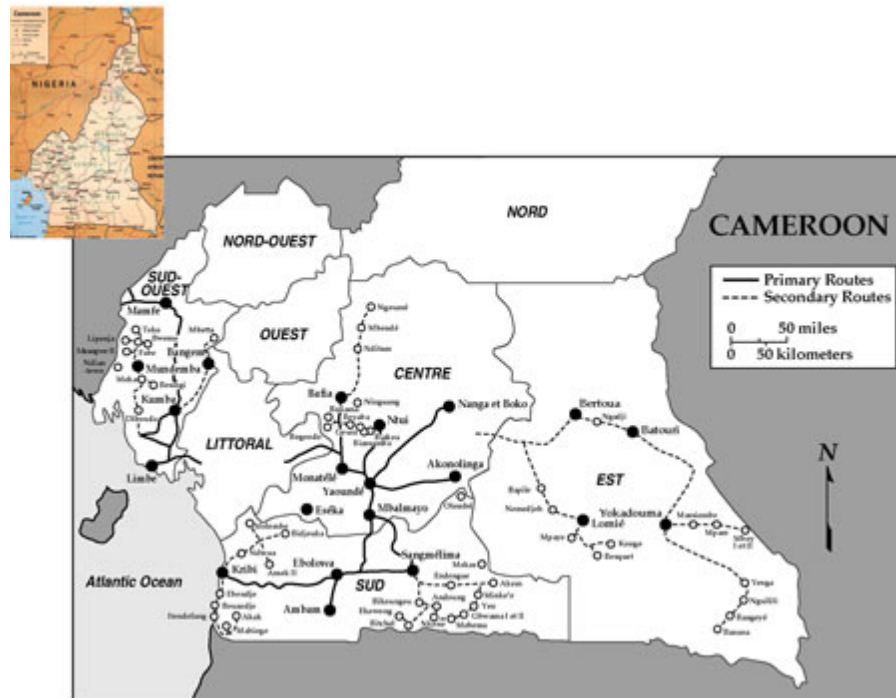


Figure 1. A map of Cameroon created without the benefit of GIS. (2)

However, what I thought was going to be a simple "download and open file" routine became the first major headache on my road to learning GIS. Although I had downloaded all the necessary files, the files were not in a format that was compatible with ArcMap version 8.3. I quickly learned about a handy resource: I called ESRI's help line and this issue, which I spent hours agonizing over, was solved in less than thirty minutes.

During this time, I also read books and magazines about GIS to learn more about the program I was using and the field in general. In many of those publications, I read that color usage was a very important part of GIS. I never understood that statement until I started to assemble and make a map myself. After adding layer after layer to my map (each part of the map is called a layer; for example, in my map, there was one layer for all the village names, one for the rivers, and so on), I found it very difficult to make the symbols distinct from each other with the colors that were automatically provided by the computer program. I ended up spending days strategizing and experimenting to find the clearest and most effective way to present the data on the map.

Over the course of the summer, it seemed that each time I mastered one part of the program, another would instantly cause me trouble. On many occasions, I turned to the ArcGIS help guide that is provided as part of the program. However, to my

disappointment, I found that often the explanation included too many technical words, or I simply was not able to find an answer to my question.

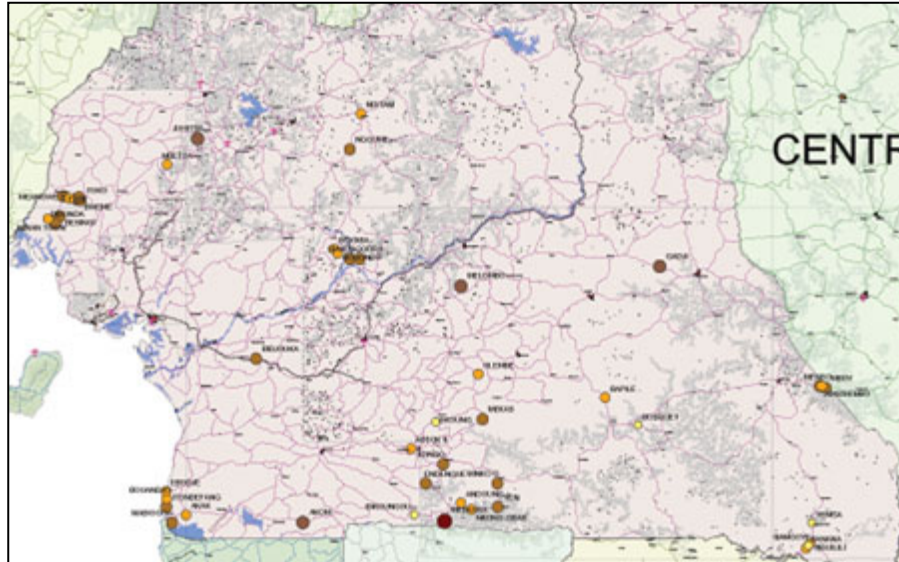


Figure 2. A detail-rich map of Cameroon created by the author using ArcGIS.

I soon realized that the best way for me to learn this software was simply to "play" with it: to click each button in the toolbar and see what it did and to be intrepid in investigating its menus and options. As the summer came to a close, I couldn't believe how much of the software I had learned.

Although the villages of Cameroon we were working with in this project had been plotted before in a previous paper, it was not done using GIS, and thus the map was not very precise (compare Figures 1 and 2). Using GIS, we were not only able to plot the villages with varying percentages of HIV prevalence, but also to represent other variables, such as strains of HIV, on the map. While there is always more to learn, I have found through this experience that with GIS, it is possible for even a beginner to create a clear, useful map.

1. ESRI Virtual Campus: <http://campus.esri.com/>

2. Nyambi P, Zekeng L, Kenfack H, Tongo M, Nanfack A, Nkombe I, Ndonko I, Shang J, Burda S, Mbah H, Agyingi L, Zhong P, Nadas A, Zolla-Pazner S, Marmor M. Human immunodeficiency virus infection in rural villages of Cameroon. *J Acq Immune Deficiency Syndr* 2002; 31:506-513.

### Author Biography

*Benita Liao is currently a senior (class of 2004) at Harvard University studying the History of Science. She can be reached at [bliao@harvard.edu](mailto:bliao@harvard.edu).*

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Archives



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## A Primer for Panel Data Analysis

By [Robert Yaffee](#)

Panel data analysis is an increasingly popular form of longitudinal data analysis among social and behavioral science researchers. A panel is a cross-section or group of people who are surveyed periodically over a given time span.

In this article, we will consider a small sample of panel data analytic applications in the social sciences. Then we will address the data structure for panel analysis. Principal models of panel analysis will be summarized, along with some of their relative advantages and disadvantages. We will discuss a test to determine whether to use fixed or random effects models.

After a synopsis of methods of estimations tailored to different situations, we will conclude with a brief discussion of popular software capable of performing panel analysis.

### Some Applications of Panel Analysis

Panel data analysis is a method of studying a particular subject within multiple sites, periodically observed over a defined time frame. Within the social sciences, panel analysis has enabled researchers to undertake longitudinal analyses in a wide variety of fields. In economics, panel data analysis is used to study the behavior of firms and wages of people over time. In political science, it is used to study political behavior of parties and organizations over time. It is used in psychology, sociology, and health research to study characteristics of groups of people followed over time. In educational research, researchers study classes of students or graduates over time.

With repeated observations of enough cross-sections, panel analysis permits the researcher to study the dynamics of change with short time series. The combination of time series with cross-sections can enhance the quality and quantity of data in ways that would be impossible using only one of these two dimensions (Gujarati, 638). Panel analysis can provide a rich and powerful study of a set of people, if one

is willing to consider both the space and time dimension of the data.

### The Panel Approach: An Overview

Panel data analysis endows regression analysis with both a spatial and temporal dimension. The spatial dimension pertains to a set of cross-sectional units of observation. These could be countries, states, counties, firms, commodities, groups of people, or even individuals. The temporal dimension pertains to periodic observations of a set of variables characterizing these cross-sectional units over a particular time span.

An example of a panel data set is a collection of three countries for which there are the same economic variables—such as personal expenditures, personal disposable income, and median household income, per capita income, personal disposable income, population size, unemployment, and employment—collected annually for ten years. This pooled data set, sometimes called time series cross-sectional data, contains a total of  $3 \times 10 = 30$  observations. In other words, the three countries are followed for ten years and are sampled annually.

### Panel Data Set Structure

Panel data sets generally include sequential blocks or cross-sections of data, within each of which resides a time series. A typical panel data set, including country, year, personal disposable income, personal expenditures, and median household income from 1991 through 2001 would look like:

Countryid	Year	pdinc	persexp	hhldinc
Xylandia	1991	34000	25000	60000
Xylandia	1992	35000	26000	71000
Xylandia	1993	36050	26500	72000
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
Xylandia	2001	45000	35000	92000
Bergunia	1991	23000	19000	55000
Bergunia	1992	24000	20100	57000
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
Begunia	2001	40000	35000	88000
Taimat	1991	30999	20000	63000
Taimat	1992	31000	21000	62030
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
Taimat	2001	36000	28000	69040

Apart from the variable number, the data structure confers upon the variables two dimensions. They have a cross-sectional unit of observation, which in this case is country  $i$ . They have a temporal reference,  $t$ , in this case the year. The error term has two dimensions, one for the country and one for the time period. In this exemplar, assume that there are three countries and ten years of time. Even though time is nested within the cross-section in this example, Lois Sayrs (1989) writes that under some circumstances the cross-sections may be nested within time. If there are no missing values, the data set is called a balanced panel, but if there are missing values, the data set is referred to as an unbalanced panel.

### The Panel Analysis Equation

Therefore, the equation explaining personal expenditures might be expressed as:

$$y_{it} = a_i + \beta_1 X_{1it} + \beta_2 X_{2it} + e_{it}$$

e.g.,

$$PE_{it} = a_i + \beta_1 HHinc_{it} + \beta_2 PDI_{2it} + e_{it} \quad (Eq.1)$$

### Types of Panel Analytic Models

There are several types of panel data analytic models. There are constant coefficients models, fixed effects models, and random effects models. Among these types of models are dynamic panel, robust, and covariance structure models. Solutions to problems of heteroskedasticity and autocorrelation are of interest here. We will try to summarize some of the prominent aspects of this kind of methodology, but first we need to consider the data structure.

#### The Constant Coefficients Model

One type of panel model has constant coefficients, referring to both intercepts and slopes. In the event that there is neither significant country nor significant temporal effects, we could pool all of the data and run an ordinary least squares regression model. Although most of the time there are either country or temporal effects, there are occasions when neither of these is statistically significant. This model is sometimes called the pooled regression model.

#### The Fixed Effects Model (Least Squares Dummy Variable Model)

Another type of panel model would have constant slopes but intercepts that differ according to the cross-sectional (group) unit—for example, the country. Although there are no significant temporal effects, there are significant differences among countries in this type of model. While the intercept is cross-section (group) specific and in this case differs from country to country, it may or may not differ over time. These models are called fixed effects models.

After we discuss types of fixed effects models, we proceed to show how to test for the presence of statistically significant group and/or time effects. Finally, we discuss the advantages and disadvantages of the fixed effects models before entertaining alternatives. Because  $i-1$  dummy variables are used to designate the particular country, this same model is sometimes called the Least Squares Dummy Variable model (see Eq. 2).

$$y_{it} = a_1 + a_2 group_1 + a_3 group_2 + \beta_1 X_{1it} + \beta_2 X_{2it} + e_{it}$$

—e.g.,

$$PE_{it} = a_1 + a_2 Country_1 + a_3 Country_2 + \beta_1 PDI_{1it} + \beta_2 HHinc_{2it} + e_{it} \quad (Eq.2)$$

Another type of fixed effects model could have constant slopes but intercepts that differ according to time. In this case, the model would have no significant country differences but might have autocorrelation owing to time-lagged temporal effects. The residuals of this kind of model may have autocorrelation in the process. In this case, the variables are homogenous across the countries. They could be similar in region or area of focus. For example, technological changes or national policies would lead to group specific characteristics that may effect temporal changes in the variables being analyzed. We could account for the time effect over the  $t$  years with  $t-1$  dummy variables on the right-hand side of the equation. In Equation 3, the dummy variables are named according to the year they represent.

$$y_{it} = \alpha_i + \lambda_t + \beta_1 X_{it} + \beta_2 X_{it} + e_{it}$$

-e.g.,

$$PE_{it} = \alpha_i + \lambda_1 Year1991 + \lambda_2 Year1992 + \dots + \lambda_n Year2000 \quad (Eq.3) \\ + \beta_1 PDI_{it} + \beta_2 HHinc_{it} + e_{it}$$

There is another fixed effects panel model where the slope coefficients are constant, but the intercept varies over country as well as time. In Equation 4, we would have a regression model with  $i-1$  country dummies and  $t-1$  time dummies. The model could be specified as follows:

$$PE_{it} = \alpha_0 + \alpha_1 Country_1 + \alpha_2 Country_2 \\ + \lambda_0 + \lambda_1 1991 + \lambda_2 1992 + \dots + \lambda_n 1999 \quad (Eq.4) \\ + \beta_1 PDI_{it} + \beta_2 HHinc_{it} + e_{it}$$

Another type of fixed effects model has differential intercepts and slopes. This kind of model has intercepts and slopes that both vary according to the country. To formulate this model, we would include not only country dummies, but also their interactions with the time-varying covariates (Eq. 5).

$$PE_{it} = \alpha_1 + \alpha_2 Country_2 + \alpha_3 Country_3 \\ + \beta_1 PDI_{it} + \beta_2 HHinc_{it} + \\ + \beta_4 * Country_2 * PDI_{it} + \beta_5 * Country_3 * PDI_{it} \quad (Eq.5) \\ + \beta_6 * Country_2 * HHinc_{it} + \beta_7 * Country_3 * HHinc_{it} + e_{it}$$

In this model, the intercepts and intercepts vary with the country. The intercept for Country<sub>1</sub> would be  $\alpha_1$ . The intercept for Country<sub>2</sub> would also include an additional intercept,  $\alpha_2$ , so the intercept for Country<sub>2</sub> would be  $\alpha_1 + \alpha_2$ . The intercept for Country<sub>3</sub> would include an additional intercept. Hence, its intercept would be  $\alpha_1 + \alpha_3$ . The slope for  $PDI_{2it}$  with Country<sub>2</sub> would be  $\beta_2 + \beta_4$ , while the slope for  $PDI_{2it}$  with Country<sub>3</sub> would be  $\beta_2 + \beta_5$ . One could similarly compute the slope for  $HHinc_{3it}$  with Country<sub>2</sub> as  $\beta_3 + \beta_6$ . In this way, the intercepts and slopes vary with the country.

There is also a fixed effects panel model in which both intercepts and slopes might vary according to country and time. This model specifies  $i-1$  Country dummies,  $t-1$  Time Dummies, the variables under consideration and the interactions between them. If all of these are statistically significant, there is no reason to pool. The degree of freedom consumption leaves this model with few degrees of freedom to test the variables. If there are enough variables, the model may not be analyzable.

### Fixed Effect Hypothesis Testing

We may wish to hierarchically test the effects of the fixed effects model. We use the pooled regression model as the baseline for our comparison. We first test the group (country) effects. We can perform this significance test with an F test resembling the structure of the F test for  $R^2$  change.

$$F_{\text{groupeffects}} = \frac{(R_{\text{fixed}}^2 - R_{\text{pooled}}^2)/(n-1)}{(1 - R_{\text{LSDV}}^2)/(nT - n - k)} \quad (Eq.6)$$

Here  $T$ =total number of temporal observations.  $n$ =the number of groups, and

$k$ =number of regressors in the model. If we find significant improvements in the  $R^2$ , then we have statistically significant group effects.

We also want to test for the time effects. This can be done by a contrast, using the first or last time point as a reference. We assume that the sum of the time effects is equal to zero. Referring to Equation 3, we use a contrast, which is a paired  $t$  test between the reference and test value. Greene (2003) expresses Eq. 3 more generally as:

$$y_{it} = \alpha_i + \gamma_t + x_{it}'\beta + \varepsilon_{it} \quad (\text{Eq.7})$$

In this formulation, the group effects are the  $\alpha_i$ s and the time effects are the  $\gamma_t$ s.

One can obtain least squares estimates for  $y$ s and  $x$ s with:

$$\begin{aligned} \hat{y}_{it} &= y_{it} - \bar{y}_i - \bar{y}_t + \bar{y} \\ \hat{x}_{it} &= x_{it} - \bar{x}_i - \bar{x}_t + \bar{x} \end{aligned} \quad (\text{Eq.8})$$

$$\begin{aligned} \bar{y} &= \frac{\sum_{i=1}^n y_{it}}{n} \\ &= \frac{\sum_{i=1}^n \sum_{t=1}^T y_{it}}{nT} \end{aligned}$$

Greene (2003) formulates the time effects by:

$$\hat{\gamma}_t = c_t = (\bar{y}_t - \bar{y}) - (\bar{x}_t - \bar{x})'b \quad (\text{Eq.9})$$

We can test for group, time, and interaction effects, assuming that we have not consumed all of our degrees of freedom. We hope to see an improvement in the  $R^2$  without a problem with autocorrelation. If the panels are unbalanced, adjustments

to the total counts are made. By using  $\sum_{i=1}^n T_i$  instead of  $nT$  to account for the total number of observations, proper variances and F tests are computed. Hence, the unbalanced panels are easy to accommodate.

Because fixed effects estimators depend only on deviations from their group means, they are sometimes referred to as within-groups estimators (Davidson and MacKinnon, 1993). If the cross-sectional effects are correlated with the regressors, then the cross-sectional effects will be correlated with the group means. Ordinary least squares estimation on the pooled sample would be inconsistent, even though the within-groups estimator would be consistent. If, however, the fixed effects are uncorrelated with the regressors, the within-groups estimator will not be efficient. If there is only variation between the group means, then it would be permissible to use the between-groups estimator, but this would be inconsistent if the cross-sectional errors are correlated with the group means of the regressors (Davidson and MacKinnon, 1993).

#### Fixed Effects Pros and Cons

Fixed effects models are not without their drawbacks. The fixed effects models may frequently have too many cross-sectional units of observations requiring too many dummy variables for their specification. Too many dummy variables may sap the model of sufficient number of degrees of freedom for adequately powerful statistical tests. Moreover, a model with many such variables may be plagued with multicollinearity, which increases the standard errors and thereby drains the model of statistical power to test parameters. If these models contain variables that do not vary within the groups, parameter estimation may be precluded. Although the model residuals are assumed to be normally distributed and homogeneous, there could easily be country-specific (groupwise) heteroskedasticity or autocorrelation over time that would further plague estimation.

The one big advantage of the fixed effects model is that the error terms may be correlated with the individual effects. If group effects are uncorrelated with the group means of the regressors, it would probably be better to employ a more parsimonious parameterization of the panel model.

### The Random Effects Model

Prof. William H. Greene calls the random effects model a regression with a random constant term (Greene, 2003). One way to handle the ignorance or error is to assume that the intercept is a random outcome variable. The random outcome is a function of a mean value plus a random error. But this cross-sectional specific error term  $v_i$ , which indicates the deviation from the constant of the cross-sectional unit (in this example, country) must be uncorrelated with the errors of the variables if this is to be modeled. The time series cross-sectional regression model is one with an intercept that is a random effect.

$$\begin{aligned} y_{it} &= \beta_{0i} + \beta_1 x_{it} + \beta_2 x_{it} + e_{it} \\ \beta_{0i} &= \beta_0 + v_i && \text{(Eq.10)} \\ \therefore y_{it} &= \beta_0 + \beta_1 x_{it} + \beta_2 x_{it} + e_{it} + v_i \end{aligned}$$

Under these circumstances, the random error  $v_i$  is heterogeneity specific to a cross-sectional unit—in this case, country. This random error  $v_i$  is constant over time.

Therefore,  $E[v_i^2 | x] = \sigma_i^2$ . The random error  $e_{it}$  is specific to a particular observation. For  $v_i$  to be properly specified, it must be orthogonal to the individual effects. Because of the separate cross-sectional error term, these models are sometimes called one-way random effects models. Owing to this intrapanel variation, the random effects model has the distinct advantage of allowing for time-invariant variables to be included among the regressors.

### Error Components Models

If, however, the random effects model depends on both the cross-section and the time series within it, the error components (sometimes referred to as variance components) models are referred to as a two-way random effects model. In that case, the error term should be uncorrelated with the time series component and the cross-sectional (group) error. The orthogonality of these components allows the general error to be decomposed into cross-sectional specific, temporal, and individual error components.

$$e_{it} = v_i + e_t + \eta_{it} \quad \text{(Eq.11)}$$

The component,  $v_i$ , is the cross-section specific error. It affects only the observations in that panel. Another,  $e_t$ , is the time-specific component. This error

component is peculiar to all observations for that time period,  $t$ . The third  $\eta_{it}$  affects only the particular observation. These models are sometimes referred to as two-way random effects models (SAS, 1999).

### The Random Parameters Model

In the Hildreth, Houck, and Swamy random coefficient model, the parameters are allowed to vary over the cross-sectional units. This model allows both random intercept and slope parameters that vary around common means. The random parameters can be considered outcomes of a common mean plus an error term, representing a mean deviation for each individual. This model assumes neither heteroskedasticity nor autocorrelation within the panels to avoid complicating the covariance matrix.

In multilevel models pertaining to students, schools, and cities, there can be individual student, school, and city random error terms as well. There can also be cross-level interactions within these hierarchical models.

### Dynamic Panel Models

If there is autocorrelation in the model, it is necessary to deal with it. One can apply one or more of the several tests for residual autocorrelation. The Durbin-Watson test for first-order autocorrelation in the residuals was modified by Bhargava et al. to handle balanced panel data. Baltagi and Wu (1999) modified it further to handle unbalanced panel and equally spaced data (STATA, 2003). There may be panel specific autocorrelation or there may be common autocorrelation across all panels. There are provisions for specifying the type of autocorrelation. Alternatively, an autoregression on lags of the residuals may indicate the presence or absence of autocorrelation and the need for dynamic panel analysis.

If there is autocorrelation from one temporal period to another, it is possible to analyze the "differences in differences" of these observations, using the first or last as a baseline (Wooldridge, 2002). If autocorrelation inheres across these observations, the model may be first partial differenced to control for the autocorrelation effects on the residuals (Greene, 2002). Arellano and Bond introduced lagged dependent variables into their model to account for dynamic effects. The lagged dependent variables can be introduced to either fixed or random effects models. Their inclusion assumes that the number of temporal observations is greater than the number of regressors in the model.

Even if one assumes no autocorrelation, problems from the correlation of the lagged endogenous and the disturbance term may plague the analysis. Bias can result especially when the sample is finite or small. If one uses general methods of moments, with instrumental variables, the use of the proxy variables or instruments may circumvent problems with correlations of errors. Moreover, there are a large number of instruments provided by lagged variables. GMM with these instruments and larger orders of moments can be used to obtain additional efficiency gains.

Another approach to deal with autocorrelation in the random errors is the Parks method. The model assumes an autoregressive error structure of the first order along with contemporaneous correlation among the cross-sections and this model is estimated by a two-state generalized least squares procedure (SAS Institute, 1999).

$$e_{it} = \rho e_{i,t-1} + \eta_{it} \quad (\text{Eq.12})$$

Panel data models with generalized estimating equations can handle higher order panel data analysis.

## Robust Panel Models

There are a number of problems that plague panel data models. Outliers can bias regression slopes, particularly if they have bad leverage. These outliers can be downweighted with the use of M-estimators in the model. Heteroskedasticity problems arise from groupwise differences, and often taking group means can remove heteroskedasticity. The use of a White heteroskedasticity consistent covariance estimator with ordinary least squares estimation in fixed effects models can yield standard errors robust to unequal variance along the predicted line (Greene, 2002; Wooldridge, 2002).

Sometimes autocorrelation inheres within the panels from one time period to another. Some problems with dynamic panels that contain autocorrelation in the residuals are handled with a Prais-Winston transformation or a Cochrane-Orcutt transformation that amounts to a first partial differencing to remove the bias from the autocorrelation. Arellano, Bond, and Bover developed one and two step general methods of moments (GMM) estimators for panel data analysis. GMM is usually robust to deviations of the underlying data generation process to violations of heteroskedasticity and normality, insofar as they are asymptotically normal but they are not always the most efficient estimators.

If there is autocorrelation in the models, one can obtain a weight-adjusted combination of the White and Newey-West estimator to handle both the heteroskedasticity and the autocorrelation in the model.

## Specification Tests: the Quandary of Random or Fixed Effect Models

The Hausman specification test is the classical test of whether the fixed or random effects model should be used. The research question is whether there is significant correlation between the unobserved person-specific random effects and the regressors. If there is no such correlation, then the random effects model may be more powerful and parsimonious. If there is such a correlation, the random effects model would be inconsistently estimated and the fixed effects model would be the model of choice.

The test for this correlation is a comparison of the covariance matrix of the regressors in the LSDV model with those in the random effects model. The null hypothesis is that there is no correlation. If there is no statistically significant difference between the covariance matrices of the two models, then the correlations of the random effects with the regressors are statistically insignificant. The Hausman test is a kind of Wald  $\chi^2$  test with  $k-1$  degrees of freedom (where  $k$ =number of regressors) on the difference matrix between the variance-covariance of the LSDV with that of the Random Effects model. SAS, SPSS and LIMDEP all contain the Hausman specification test. LIMDEP also contains the Bhargava and Sargan Test (1983).

## Model Estimation

Models have to be estimated by methods that handle the problems afflicting them. A constant coefficients model with residual homogeneity and normality can be estimated with ordinary least squares estimation (OLS). As long as there is no groupwise or other heteroskedastic effects on the dependent variable, OLS may be used for fixed effects model estimation as well (Sayrs, 1989). For OLS to be properly applied, the errors have to be independent and homoskedastic. Those conditions are so rare that it is often unrealistic to expect that OLS will suffice for such models (Davidson and MacKinnon, 1993).

Heteroskedastic models are usually fitted with estimated or feasible generalized least squares (EGLS or FGLS). Heteroskedasticity can be assessed with a White or a Breusch-Pagan test. For the most part, fixed effects models with groupwise

heteroskedasticity cannot be efficiently estimated with OLS. If the sample size is large enough and autocorrelation plagues the errors, FGLS can be used. Random sampling and maximum likelihood iterated by generalized least squares have also been used (Greene, 2002). Beck and Katz (1995) reportedly found that if the sample size is finite or small, the total number of temporal observations must be as large as the number of panels; moreover they reportedly found that OLS with panel corrected errors provided more efficient estimation than FGLS (Greenberg, 2003; STATA, 2003).

If the model exhibits autocorrelation and/or moving average errors, first differences (Wooldridge, 2002) or GLS corrected for ARMA errors can be used (Sayrs, 1989). Hausman and Taylor (1981) have used weighted instrumental variables, based only on the information within the model, for random effects estimation to be used when there are enough instruments for the modeling. The instrumental variables, which are proxy variables uncorrelated with the errors, are based on the group means. The use of these instrumental variables allows researchers to circumvent the inconsistency and inefficiency problems following from correlation of the individual variables with the errors.

For dynamic panels with lagged dependent variables, Arellano, Bond, and Bover have used general methods of moments, which are asymptotically normal (Wooldridge, 2002). With greater numbers of moment conditions, they are able to handle some missing data and they can attain gains in efficiency as long as there are three or four periods of data (Greene, 2002).

Another estimation procedure was developed by Arnold Zellner, called seemingly unrelated regression (SUR) requires that the number of explanatory variables in each cross-section is the same. In the SUR approach, variables are transformed with a form of Cochrane-Orchutt correction to model the autocorrelation. Feasible generalized least squares is used to estimate a covariance matrix. The parameter estimates are also modeled. The process is iterated until the errors are minimized.

LIMDEP 8 (Greene, 2002) has its own protocol for estimating random parameter models, including the limited dependent variable models. The limited dependent variable models are population averaged models. In LIMDEP, the estimation for such models begins with an OLS estimation of starting values and then proceeds to simulation with Halton draws. This procedure, Greene maintains, is generally faster than the quadrature estimation used by Stata. When the panels are large in number and size, it may be the only timely method for estimation.

If there are enough temporal observations, they can use either the lagged levels or lagged differences as instruments, while the other variables serve as their own instruments in an extension. If group sizes are larger than 20 and the autocorrelation is higher than 0.4, the random effects quadrature algorithms can bog down or even fail to converge (STATA, 2003).

Robust estimation, when one has heteroskedasticity, autocorrelation, or outliers to contend with, may be performed with the general methods of moments and combination of White and Newey-West estimators to obtain robust panel standard errors. Arellano, Bond, and Bover have used GMM in their models and these are incorporated into LIMDEP version 8 and Stata version 8 special edition. GMM models tend to be robust with respect to heteroskedasticity and nonnormality. Professors Jeffrey Powell and Kenneth Chay (2003), University of California at Berkeley, have applied robust estimation to semiparametric censored panel data regression analysis (<http://elsa.berkeley.edu/~kenchay/ftp/binresp/jepfinal.pdf>, September 21, 2003). They have used least absolute deviations estimation, a form of robust modeling that is relatively invulnerable to outlier distortion, to apply to censored data.

### Statistical Packages

Among those statistical packages that excel in programs for panel data analysis are

LIMDEP, STATA, and SAS. Although all three packages have procedures dedicated to panel data analysis, LIMDEP and STATA appear to have a particularly rich variety of panel analytic procedures. All three packages have fixed and random effects models, can handle balanced or unbalanced panels, and have one- or two-way random and fixed effects models. Although LIMDEP and STATA have the both Hausman and Sargan tests for specification, SAS has only the Hausman specification test. Both LIMDEP and STATA have the Hausman and Taylor estimator for random effects. All three packages have procedures that can correct for autocorrelation in the models. LIMDEP and STATA have Arellano, Bond and Bover's estimator for dynamic panel models, whereas SAS uses the Parks method. LIMDEP, STATA, and SAS procedures can handle groupwise heteroskedasticity in the random effects model. LIMDEP and STATA have the Hildreth, Houck, and Swamy random coefficients model. Stata has xtreg for performing a random coefficient analysis with only a random intercept. When more than one random coefficient has to be analyzed, one can use the gllamm (generalized linear latent and mixed models) procedure (Twisk, 2003). SAS can perform this kind of analysis with its Mixed procedure. STATA and LIMDEP have procedures for panel corrected standard errors. SAS has a variance component moving average (De Silva) procedure.

Both LIMDEP and STATA have procedures for limited dependent panel data analysis. They have poisson, negative binomial, logit, probit, and complimentary log-log panel models with either fixed or random effects. Although Stata can model these limited dependent variable models as random effects or population averaged models (with the exceptions of the poisson and negative binomial models, which can be modeled as fixed, random, or population averaged models), LIMDEP can model them as either fixed or random effects models. Both can analyze panel stochastic frontier models.

STATA and LIMDEP have cross-sectional time series population average generalized estimating equation models as well. These model use a variety of link functions (identify, log, logit, probit, negative binomial, and complimentary log-log), distribution families (Gaussian, inverse Gaussian, binomial, poisson, negative binomial, and gamma) and working correlation matrix structures (independent, exchangeable, autoregressive, stationary, structured, and unstructured) that provide for a flexible modeling for equally or unequally spaced correlation structures of panel data with iterated reweighted least squares estimation. LIMDEP has a procedure for the random parameters model and for a Latent Class Linear Regression model.

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### Author Biography

*Robert Yaffee, Ph.D. is a statistician within the Social Sciences, Statistics & Mapping Group of ITS' Academic Computing Services. He can be reached at [robert.yaffee@nyu.edu](mailto:robert.yaffee@nyu.edu).*

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