Scholarship @ R·I·T

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The RIT Faculty Scholars Series:
Chance Glenn Presents on Digital Processing

PHOTO BY JENNIFER FREER

Chance Glenn

The right and left brain connection conjoined in a packed Idea Factory, on April 13, 2006. Featured scholar, Dr. Chance Glenn (College of Applied Science and Technology), presented "When the Artistic Meets the Scientific: A New Method of Digital Processing for Audio, Video, and Images." Glenn admitted to the audience that he has always been interested in electronics, in addition to art and music, hence his interest in the connection of the two sides of the brain as a meeting ground for creativity.

The presentation detailed the functions of the brain, each side governing the opposite side of the human body while the left brain governs the abstract, analytical thought, and mathematics, and the right brain is at home with feelings, creativity, and rhythm.

Glenn demonstrated how his passion for creating music merged with an interest in the non-linear dynamics of the waves and shapes of sound, the latter also part of his Ph.D. research in chaotic dynamics involving a new method for compressing video and audio images. Further research on the dynamics-based algorithmic compression is under development by CAST's DYNAMAC Media Research Group. View Glenn's presentation at: *https://ritdml.rit.edu/dspace/handle/1850/1783.*

Marianne Buehler / Wallace Library

Locating cross-disciplinary research...

As more and more research on our campus becomes cross disciplinary, finding resources that fall outside a researcher's range of expertise may be confusing or seem extraordinarily complicated. We all become very comfortable with our own areas of interest. The jargon of our expertise is part of our every day conversations and we know where to find relevant and reliable information. For many, once we step into someone else's area of comfort, listening to this jargon and finding relevant/reliable information may feel like visiting a foreign country and not knowing the language. Not to worry though, the Library has subject specialists for each of the colleges who are well-versed in both the jargon(s) and the information resources for their individual college. We are ready to assist you with your research in or out of your area of expertise. Subject specialists' contact information: *http://library.rit.edu/electronic/electronic.html*

Various RIT activities are highlighted in this issue, such as right brain/left brain creativity, the influence of mass media, student entrepreneurship, interactive social awareness design, chemistry lab plagiarism, a variety of safety-critical systems, RIT student intellectual property, *RadRails*, task robots, NTID student researchers, eye tracking, deaf students' access to the hard sciences, digital display systems, AMC Lab news, a new OpenBook@RIT book release, and some recent RIT DML submissions.

Margaret Bartlett / Wallace Library

"If we knew what it was we were doing, it would not be called research, would it?" Albert Einstein (1879 - 1955)

Two RIT Students Best their "Betters"
College of Liberal Arts

Two graduate students in the communication & media technologies graduate program won top honors at the Eastern Communication Association's annual conference in Philadelphia, PA, on April 27th. Michael Horning and Janet Ofano presented two of the top three research papers as part of a competitive panel of the Mass Communication Division. Panel competitors included faculty from colleges and universities across the country.

Horning determined which studies in mass media were most influential by finding the most cited articles in the literature according to the *Social Science Citation Index*. The key words "mass media" were searched across 4,146,710 articles in a total of 1892 journals. Of the top 58 articles cited in the years between 1973 and the present, three areas received more focus than any other, such as the influence of the mass media in the lives of adolescents, the role of the mass media in influencing public health standards, and the emergence of three media theories. The first of the three, the "agenda-setting theory," maintains that the press tells us not what to think but what to think about. The "uses and gratifications" theoretical approach assumes that media users play an active role in choosing and using the media and are goal-oriented in their media use. The "third-person effect theory" holds that people perceive mass media messages as having greater effects on others than themselves.

Janet Ofano

Using a sample of RIT students, Ofano tested the "third-person effect theory" to investigate the theft of copyrighted music files on the Internet and the perceived effects of media reports surrounding lawsuits brought against individuals. Students reported that they have illegally downloaded files and continue to do so. Ironically, media coverage was found to prompt them to continue their behavior. Ofano's study contradicts many previous studies in that respondents reported that they were more affected by these media reports about the lawsuits than others. The study suggests that media coverage might even produce a "first person effect," whereby individuals perceive media affecting themselves more than others.

Rudy Pugliese / Communication & Media Technologies

A New Twist to a Career-focused Education
College of Business

Three years ago, RIT developed the new campus-wide entrepreneurship and innovation initiative, the Program for Innovation and Entrepreneurship (PIE). An essential aspect of PIE is the Student Business Development Laboratory Program (SBDLP), a program that enables students to advance a new business project as an integral component of their RIT education. The program seeks to advance early stage student business projects. Its objective is not necessarily to create successful businesses, but to provide select students with a multi-disciplinary and applied learning experience. The program supports student efforts to advance new venture and product commercialization learning experiences through business coaching and team development. Students may also use the student business lab space, which is located on the first floor of RIT's Venture Creations. While working on their project, multi-disciplinary teams may gain course or cooperative educational experience credit (co-op).

> "The recruiters were very impressed with my experience starting a company, in fact, they wanted to initially talk to me about programming positions, but during the interview, they shifted my application to project management."
> Brian Lio

In the past year, a test group of students entered the SBDLP. The program requires students to form multi-disciplinary teams typically composed of business, technical, and creatively-oriented students. Students enter the program with a defined business plan and faculty mentor. The group then comes to an agreement with their sponsors on the appropriate milestones and learning goals.

The program has already graduated a number of participants, currently including five teams. Brian Lio, a computer science undergraduate student, considers his time in the program a great learning experience. Lio worked on a minor in entrepreneurship, envisioning and implementing a new software service business. He diligently developed and managed a motivated student team, speaking with prospective clients, and creating a unique beta application software. Now, close to graduation, Lio has elected to wind down his business. He continues to see entrepreneurship in his future, but has decided to gain experience as a project manager with Microsoft (Seattle, WA) after graduation. Lio attributes his new position largely to the experience gained by starting his own business. *http://www.cob.rit.edu/entrepreneurship*

Richard DeMartino / Management

Interactive Design on the Road
College of Imaging Arts & Sciences

Graphic design is often associated exclusively with commercial marketing, but Bill Klingensmith would like to challenge this view with a project that demonstrates how interactive design can promote social awareness and serve as an outlet for pure, artistic self-expression. This content-driven, cross-disciplinary project also incorporates his interests in photography and printing.

In the summer of 2005, Klingensmith created the *Drive Project*, an award-winning website that presents a compressed version of a cross-country road trip. More than 15,000 images were collected and incorporated on the website over the six-day driving period into an engaging, interactive map. One digital image was taken every ten seconds of the drive. Visitors to the site: *http://www.driveproject.com* can explore the images using a simple graphic interface, creating their own custom experience.

For the next travel odyssey, *Drive Project II: Road to Recovery*, there are plans to visit the city of New Orleans to document lingering devastation as well as the ongoing recovery efforts. The plan is to drive through various city neighborhoods and photograph them using digital cameras, a global positioning system (GPS), and an onboard computer. As with the first *Drive Project,* a distillation of the thousands of GPS-indexed images that are generated into a cohesive mapping project will be viewable on the Internet. Klingensmith has also been speaking with faculty in the School of Print Media about the possibility of creating a series of published, print on demand books from these images through Lulu.com.

The *Road to Recovery* represents an ambitious appropriation of newly available technology to form a new and compelling type of documentary. It will grant anyone with an internet connection the ability to investigate for themselves the current state of the city. This self-directed investigation will hopefully be effective in rekindling individuals' consciousness of the storm's dramatic impact. By inviting viewers to actively participate in their own exploration of the situation in New Orleans, Klingensmith hopes to inspire people to become involved in recovery efforts however they are able.

Bill Klingensmith / Graphic Design

Plagiarism in the Chemistry Lab
College of Science

Have you ever read a lab report or a writing assignment and wondered whether a student was quite advanced or the work was plagiarized? Four years ago, this experience recurred again, so I did a simple Google search using five words from a lab report using quotes. The search revealed not only that the work was plagiarized, but it was text that I had previously written myself!

My response was typical for me: anger, frustration, isolation and punishment. My only decisive action was to link my syllabi to the *RIT Academic Honesty* website.

Following the lab report incident, I contacted Marianne Buehler at the Wallace Library, asking her for a definition of plagiarism and for advice on dealing with the students. She told me about library resources on plagiarism, including the plagiarism-detection tool, Turnitin: *http://www.turnitin.com.* That conversation helped me to turn from punitive anger to a desire to teach students about plagiarism and how to avoid it. My students now complete the online tutorials on avoiding plagiarism at: *http://library.rit.edu/research-guides/citing.html* and participate in discussions about plagiarism in myCourses. The students are now required to run lab reports and papers through Turnitin.com. They have full access to the generated plagiarism reports. I experience three clear advantages to this approach:

> *I agree that the key to avoiding plagiarism is proper time management. A late start on an assignment could cause the most righteous person to be tempted to "borrow" a friend's work, or an online service.*
>
> Chemistry student

- The students can clearly see when something they have done is inappropriate.
- I no longer waste time playing culture cop. Turnitin.com is the arbiter of good and evil.
- Suspicion and mistrust seldom enter into my relationships with students.

In a recent RIT workshop with Maryellen Weimer (presenting at FITL, May 30), we briefly discussed plagiarism. She provided access to some terrific resources, including a paper I highly recommend: "Academic Integrity: Behaviors, Rates and Attitudes of Business Students toward Cheating." J. Allen, D. Fuller, M. Luckett. *J. Marketing Educ.* (1998). 20(1): 41-52. The article can be found at: *http://albert.rit.edu/search/r* - Course: Doing Pedagogical Scholarship. I used the quiz from this paper in a recent course and it evoked a wonderful discussion.

Paul Craig / Chemistry

Faculty Off-Campus

Safety-Critical Systems

In my real-time and embedded systems courses, I discuss the methods that the software engineer must employ when building safety-critical systems. A year-long sabbatical, themed, Software as a Component in Safety-Critical Systems, has provided several perspectives on software engineering of these systems at three different locations.

In fall 2005, I worked in the Division of Electrical and Software Engineering at the U.S. Food and Drug Administration (FDA), Rockville, MD. The group, which provides software engineering expertise for pre-market approval and post-market compliance of medical devices, gave me a view into the regulation of medical devices. I reviewed the software aspects of medical device pre-market applications. There was a buzz of activity in the group when we investigated the extent to which software operation contributed to the publicized failures of a number of implantable devices.

My next safety-critical systems stop was at the NASA Goddard Space Flight Center, Greenbelt, MD in the Software Engineering Laboratory. This lab developed a research tool that automatically generates designs and code from requirements' scenarios. I suggested a way to incorporate safety-properties into the methodology. A joint paper that describes this work is in preparation. There was also an opportunity to review NASA's Software Safety methods.

Currently, I am visiting the Real-Time Embedded Software discipline group at Pratt & Whitney (P&W), East Hartford, CT. This group develops embedded control software for P&W's commercial and military jet engines. My review of their design approach for developing fault-tolerant engine controllers will result in the writing of a Standard Work Description for designing the cyclic schedules that are at the heart of the controllers. I am on a task force that defines Preliminary System Safety Assessment and Failure Modes and Effects Analysis process steps. This project requires defining requirements and doing first phase implementation for a tool to assist with reporting telemetry data from the Joint Strike Fighter.

I will return to RIT with real-world examples for my classes, publications reflecting some of the work, potential continuing collaborations, and job contacts for students.

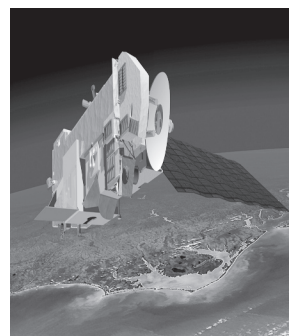*Jim Vallino / Software Engineering*

X-ray of a medical device implant

PHOTO BY DR. C. VARNIS, MD

Artist-rendering of an Aura satellite

PHOTO BY NASA GODDARD SPACE CENTER

The Joint Strike Fighter jet

PHOTO BY HTTP://JSF.MIL

Copyright Corner

Plagiarism, what can be done about it?

As Samuel Ginder (U.S. navy captain) once said about the complexities of morality, "If moral behavior were simply following rules, we could program a computer to be moral."

One solution, is an online ethics and plagiarism resource that also has an enhanced subscription option, is the *Center for Academic Integrity* (CAI). Its roots reach back to 1992, but it has evolved into a combined effort with Duke University's *Kenan Institute for Ethics*. The basic website includes college and university honor codes and academic integrity policies, an extensive list of honesty-related quotations, plagiarism-avoidance articles, new research by Don McCabe (known for his comprehensive student and academic integrity surveys), links to ethics and values websites, and a searchable 700+ item bibliographic database.

The subscription version has additional resources, such as a plagiarism bibliography (that could use an update with more recent articles) and an honor and integrity systems, policies, and associations' webliography. Also available, is access to a list of dissertations on academic honesty, the *SINCERITAS* newsletter, ethics news' links, retrospective CAI conferences, case studies, and streamed video presentations. For more information: *http://www.academicintegrity.org/index.asp*

Stop by the Publishing & Scholarship Support Center if you would like to take a tour of the CAI subscription site.

Marianne Buehler / Wallace Library

Students On-Campus

RadRails is an open source Eclipse-based integrated development environment for the Ruby on Rails web support application framework. The goal of this project was to provide Rails' developers with everything they need to develop, manage, test and deploy their web applications. *RadRails* has proven to be popular among the Java and Rails' communities, having over 30,000 unique users around the world. The student team (Marc Baumbach, Matt Kent, Kyle Shank) has presented at EclipseCon and at Canadian Rails developer conferences. Their project won the "Best Open Source Eclipse-Based Developer Tool," as determined by the Eclipse community. The students will also be speaking at RailsConf, which takes place June 2006, in Chicago, IL.

Tom Reichlmayr / Software Engineering

The award-winning *RadRails* team
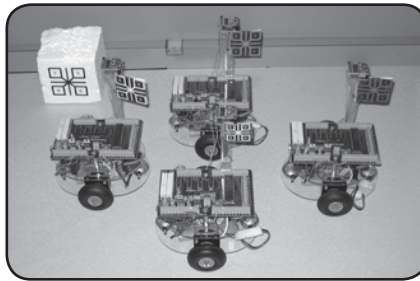
Have you seen the robots that hunt down people in the movie, *Minority Report*? These are the robot types that computer engineering students are investigating. While generations of homemade robots are built through senior design projects, Bhushan Mehendale, Eric Ernst, Gilbert Hendry, Niranjan Krishnamurthi, Mark Seidman, and Carl Kelso are developing a simulator for autonomous robots named "Maheshdas," under Dr. Yang's supervision. Funded by the Director of Central Intelligence, "Maheshdas" is a modular and flexible simulator where users have complete control over the physical, electrical and wireless capabilities of virtual robots, to see how they may behave in the real world– and no, it is not trivial to have robots autonomously accomplish collaborative tasks like in the movies.

Shanchieh Yang / Computer Engineering

Five first-year students in the AAS in ASL/English interpreting program wanted to explore the question: What do interpreters think about a classic theoretical discussion in the profession? Denise Herrera, Emily Orr, Mary Yarger, Courtney Williams, and Jonathan Shellhammer developed and piloted questions. With some advice from Online Learning's Richard Fasse, they created an online survey using *Clipboard* (an online survey system) and learned about qualitative research with Sue Foster, NTID Research & Education, and Heather Foti, from the Institute Review Board. Fifty-four interpreters from NTID/RIT's Department of Access Services and Monroe County's BOCES #1 have responded and data analysis has begun. In the meantime, students are excited about the positive comments they are hearing from working interpreters who recognize the need for innovative research.

Christine Monikowski /
ASL-English Interpreting

PHOTO BY RICHARD SMITH

First-year student researchers

Students & IP Process at RIT

Who owns the intellectual property (IP) developed by RIT students? The shortest answer is "it depends;" the most common answer is "the student."

The RIT IP Policy (C3.0) is silent on students. Why? It is a policy covering RIT employees. Certainly a student can also be an RIT employee. For that work, they are covered by the policy.

For the most part, students own the IP they create here at RIT. Exceptions to this include:

- When a student is also the employee of an outside organization. Their employer most likely owns any IP their employee generates.
- If the student was paid by RIT (including grant/contract funding) to produce certain work, then the IP would be owned by RIT.
- The student and RIT enter into an agreement defining ownership of student IP as not the student's. This is done for certain corporate-sponsored class projects. The student needs to be aware of what rights he

or she has to use the generated work as part of the sponsored project. The student also needs to have been offered an alternate project where assignment of IP ownership was not required.

RIT cannot use student-owned IP without first obtaining permission from the student, other than reviewing and providing feedback and marking assignments the student submits as part of course and other project work. *http://finweb.rit.edu/rmss/tlo/internal/ipstudents.html*

Varda Main / Technology Licensing Office

Eye-T Insights into Usability
B. Thomas Golisano College of Computing & Information Sciences

Have you ever had trouble using your cell phone or the ATM or the gas pump? If so, you are not alone. Even these commonly used products which are designed for simple tasks, are known for their difficult-to-use interfaces. Now, imagine the challenge of developing user interfaces for highly specialized software applications that support advanced scientific or engineering endeavors. In the area of bioinformatics, there are several molecular visualization applications available which allow scientists to view and explore protein structures. Although rich in functionality, many of these programs are complex and difficult to use. For example, the application, *DeepView*, has a complex user interface and a steep learning curve. Although an online tutorial is available, it requires the user to invest a great deal of time and, perhaps ironically, the tutorial itself is not highly usable. Two graduate students, Renikko Alleyne and Priya Soundararajan are working with information technology professors, Anne Haake and Evelyn Rozanski, to study the usability of *DeepView*. This research is being conducted in the Laboratory for Computer-Human Interaction and Performance Support within the Center for Advancing the Study of Cyberinfrastructure.

The research group is using eye tracking, a technique used in a variety of disciplines that includes psychology, human-computer interaction, advertising and medicine, among others. A valuable methodology for usability studies, eye tracking can help determine a person's interactive strategies. There is a strong association between where a person looks and which interface elements the person attends to and considers for action. The students are using eye tracking to analyze the problem solving strategies of domain experts while engaged in tasks using *DeepView*. By analyzing what experts have looked at, we expect to be able to design better instructions for novice users and to determine the best locations and designs of interface elements for greater usability of *DeepView*. Understanding differences in problem solving strategies related to specialized knowledge of the end user can also help to inform design of other interactive systems for bioinformatics.

Anne Haake & Evelyn Rozanski / Information Technology

Interactive Applications for Teaching & Learning
National Technical Institute for the Deaf

It started out with grants from the National Science Foundation intended to improve deaf students' access to science, technology, engineering, and mathematics (STEM) classes via sign language interpreting. Professor Marc Marschark and colleagues Patricia Sapere and Carol Convertino, in NTID's new Center for Education Research Partnerships (CERP), were taking one step at a time, looking at variables assumed to affect interpreting success. These variables made little difference to student learning, even if considered important by students and interpreters.

Over the past four years, their research has shown that neither deaf students' language fluencies nor interpreters' skills present any barrier to successful STEM education, at least for students and interpreters at RIT. Rather, the CERP research has demonstrated that students come into the classroom with varying knowledge and learning strategies which affect how they learn and how much they learn. In the case of deaf students, Marschark points out that "deaf students are not hearing students who cannot hear." Rather, their diverse backgrounds and learning experiences prior to coming to college simply make them somewhat different learners than hearing peers. The research group has obtained similar findings with international college students (both deaf and hearing) who, by similar reasoning, "are not English-speaking, North American students who come from somewhere else and speak a different language."

Discovery Learning in Pennsylvania

Research being conducted in the CERP has moved beyond interpreting and continues via the National Sign Language Interpreting Project. Studies are examining learning in multimedia classrooms, K-12 settings, and how learning from print differs from learning via spoken language and sign language. "It is more complicated than we had envisioned," Marschark notes, "but the implications for learning by students of all ages and in all contexts are tremendous." The goal is to match instructional methods with the cognitive abilities of students who enter the classroom with different strengths and needs. Ultimately, this approach should help to improve retention and academic success of diverse student populations.

Marc Marshark / Center for Education Research Partnerships

VHDL and Small Format Color Displays
College of Applied Science & Technology

The Principals of Design Automation course is required for electrical engineering technology and computer engineering technology students. At the completion of the course, students are expected to know the basics of coding for synthesis, test bench techniques, the Modelsim simulator, and the Xilinx tool flow, for targeting complex programmable logic devices and field programmable gate arrays.

A quick survey of typical college students showed that they love video images. It could be a video clip captured with a digital camera, a digital video playing on their laptop, or digital images captured with their camera phone. The project idea was to integrate a color display into a ten week lab sequence. It would culminate in a working digital display system and meet the intended learning outcomes for the course. It would also introduce students to color display technology, which has become common in embedded systems, such as cell phones and PDAs. The display system provides students with a significant project which they can present to potential employers as they interview for a cooperative educational experience.

The lab sequence has been in place for two years. Students work together in teams of two to four students. They are provided with a suggested seven week lab sequence which will culminate in a working display system. However, the groups are not forced to follow the seven labs. There have been several highly motivated teams that want to achieve more than what is described in the labs. One team wrote a JAVA application to send a motion video of a flying bird via the serial port. A different group implemented a barcode scanner which selected one of four images stored in a frame buffer to display.

The students are excited about the project and have worked many extra hours to add interesting features to their display system. During week ten, the project teams present the result of their work to the class. A number of students have commented that the project has helped them during their interview process. The result of this course development was presented at ASEE 2005.

Jeffrey Lillie / Computer Engineering Technology

Advanced Materials Characterization News
Kate Gleason College of Engineering

This is an exciting year to be working in the Advanced Materials Characterization Laboratory (AMC Lab) in the James E. Gleason building. Over the last six months, we upgraded the hardware and software for optical microscopy and scanning probe microscopy. These upgrades are providing some additional functionality as well. The equipment is being used in the spring 2006 quarter in a new 700-level technical course elective, Micro/Nano Characterization of Materials. Fourteen undergraduate and graduate students with majors ranging from mechanical engineering to materials science to microsystems engineering are enrolled in the course. The course focuses on three major characterization techniques: atomic force microscopy, x-ray diffraction, and quantitative optical microscopy. It is partially supported by a department level reform (DLR) grant from the National Science Foundation (NSF) to the microelectronic engineering department (PI: Professor S. K. Kurinec). The course will become part of a concentration program in nanotechnology and micro-electro-mechanical systems (MEMS) being developed with support from the DLR grant.

In May 2006, the AMC Lab will acquire a new Bruker AXS D8 High Resolution X-Ray Diffractometer with a Hi-Star Area Detector. The acquisition is funded by a major research instrumentation award from NSF. D8's capabilities include the highly accurate and traceable interferomatic methods of diffraction and specular reflectivity (XRR). The interference of x-rays allow

Bruker D8 X-Ray Diffractometer

us to measure three fundamental quantities, thickness, strain, and tilt, from which several others are derived. As thin films approach thicknesses of a few atomic diameters, we can measure their properties with x-rays whose wavelength is of atomic dimensions. The x-ray scattering parameters have "Goldilocks" values – not too little, not too large, but just right. The D8 equipment will become an invaluable tool in characterizing crystalline or amorphous films below 500 to 1000 nm in thickness.

Vinnie Gupta / Mechanical Engineering

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Lulu: Self-Publishing & Print on Demand

Publish and showcase your books, photos, CDs/DVDs, calendars, and more...

http://www.lulu.com/openbookRIT

On November 17, 2004, the RIT cross country team comprised of 17 teammates and myself, began running on a beach in San Diego, CA. We headed East with the goal of reaching the waters of the Atlantic Ocean, a journey of nearly 3,000 miles, to celebrate RIT's 175th anniversary. Repeating the accomplishments of the first RIT Coast-to-Coast run in 1979, we ran a continuous relay. Each runner completed a two-mile segment, then handed a baton to the next runner. We repeated this pattern day and night, surviving on energy bars, going days without showers and avoiding encounters with local police.

Upon completion of the run, President Simone suggested the idea of publishing a book about our adventure. My teammates elected me as the point-person for the project, and I soon became the main author. Compiling stories from each of the runners, writing a chronological account, and choosing from hundreds of photos, the project soon became more daunting than the run itself. The result is an enjoyable read for runners and non-runners alike: *http://www.lulu.com/coasttocoast*

OPENBOOK @R·I·T

Ryan Pancoast / Lulu Author

RIT Digital Media Library

Creating an online community of scholars...

http://ritdml.rit.edu

The RIT DML captures, distributes and preserves RIT's scholarly works. Our content grows daily as new items are added. Recent submissions include the following:

CAST—capstone project: Ochaya, Willy. "Using 3D graphic and animation software to enhance learning experiences in GED math."

CIAS—monograph: Evans, Mary Anne. Kadam, Sachin. Rothenberg, Sandra. *A Comparative study of the environmental aspects of lithographic and digital printing processes.*

R·I·T Digital Media Library

COLA—thesis: Delaney, Christopher. "The Effects of focused deterrence on gang homicide: an evaluation of Rochester's ceasefire program."

COS—preprint: Baum, Stefi. et al. "Spitzer IRS spectra of a large sample of Seyfert galaxies: a variety of infrared SEDs in the local AGN population."

GCCIS—thesis: Berg, Sara. "Recommendations for a comprehensive identity theft victimization survey framework and information technology prevention strategies."

KGCOE—thesis: Zhou, Jianming. "Indium Tinoxide (ITO) deposition, patterning and Schottky contact fabrication."

Eileen Makepeace / Wallace Library