Upstate!

3rd Annual USC Upstate Research Symposium

Sponsored by:
Research Advisory Council
The Office of Academic Affairs

Center for Undergraduate Research & Scholarship
Message From the Symposium Chair:

On behalf of the program committee, I welcome you to the third annual meeting of the USC Upstate Research Symposium. The USC Upstate Research Symposium series offers faculty and students the opportunity to showcase their current research activities and interact with other researchers in the region. This year’s meeting will be held in the Rampey Center at USC Upstate on Friday April 6th, 2007.

Dr. Charles Glassick, Senior Associate Emeritus, Carnegie Foundation for the Advancement of Teaching, will deliver our keynote address this year. Dr. Glassick’s published works include: Campus Life: In Search of Community; Scholarship Reconsidered: Priorities of the Professoriate; and Scholarship Assessed: Evaluation of the Professoriate. In the past Dr. Glassick has been the Interim President, Vice Chairman of the Board of Trustees and a Senior Fellow at the Carnegie Foundation for the Advancement of Teaching, and before that he had been the President of the Robert W. Woodruff Arts Center, Eleventh President at Gettysburg College, Interim President of Converse College, North Carolina Wesleyan College, Reinhardt College, Thomas University and Scholars’ Press. We would like to take this opportunity to express a sincere thank you to Dr. Glassick for delivering our keynote address.

The program committee has worked diligently to ensure a high-quality program at this year’s meeting. I would like to thank Cindy Jennings, Associate Vice Chancellor for Academic Affairs and Associate Professor of Nursing, and Celena Kusch, Assistant Professor of American Literature, for all their hard work in the planning of this year’s symposium. I would also like to express a sincere thank you to our sponsors for making this event possible: The Research Advisory Council, the Office of Academic Affairs, and the Center for Undergraduate Research & Scholarship.

Once again, welcome!

Sebastian van Delden, Symposium Chair
Assistant Professor of Computer Science

Symposium Location:

Rampey Center, USC Upstate, Spartanburg, SC. 29303 (See Campus Map on Back Cover)

Emergency Contact Information:

University Police: (864) 503-5911

Driving directions to USC Upstate:

From U.S. Hwy. 176/I-585 northbound – Take the East Campus Boulevard exit. Go right at the end of the exit ramp onto East Campus Boulevard. The campus is on the left.

From U.S. Hwy. 176/I-585 southbound – Take the East Campus Boulevard exit. Go left at the end of the exit ramp onto East Campus Boulevard. The campus is on the left.

From I-85 in either direction – Use Exit 72 on to U.S. 176 towards Spartanburg. Take the East Campus Boulevard exit. Go left at the end of the exit ramp onto East Campus Boulevard.

From I-26 in either direction – exit on to I-85 northbound, and follow the above directions. Using I-85 instead of Business I-85 is the preferable route.
# SYMPOSIUM SCHEDULE

<table>
<thead>
<tr>
<th>Time</th>
<th>Session/Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30am-8:00am</td>
<td>Poster Setup, Registration, Session I Setup</td>
</tr>
<tr>
<td>8:00am-8:05am</td>
<td>Welcome Address</td>
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<tr>
<td>8:05am-8:30am</td>
<td>Invited Talk: The Value of Student Research Experiences</td>
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<td></td>
<td>Charles E. Glassick, Senior Associate Emeritus, Carnegie Foundation</td>
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<tr>
<td>8:30am-9:30am</td>
<td>Session I: Human-Machine Interaction and Mathematical Modeling (I)</td>
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<tr>
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<td>Session Chair: Celena Kusch, Assistant Professor of American Literature</td>
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<tr>
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<td>Towards the Partial Calibration of an Eye-in-Hand Visually-Guided Robotic</td>
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<td></td>
<td>Manipulator</td>
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<td></td>
<td>Sebastian van Delden, Assistant Professor of Computer Science</td>
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<td>Ron Fulbright, Chair of the Informatics Department</td>
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<tr>
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<td></td>
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<tr>
<td></td>
<td>(Advisor: David Marlow, Assistant Professor of Linguistics)</td>
</tr>
<tr>
<td>9:30am-9:45am</td>
<td>Break / Poster Viewing</td>
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<tr>
<td>9:45am-10:45am</td>
<td>Session II: Instructional Methods and Resources</td>
</tr>
<tr>
<td></td>
<td>Session Chair: Angelina Tzacheva, Assistant Professor of Informatics</td>
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<tr>
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<td>An Electronic Database of Templated Problems for Pre-Calculus</td>
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<td></td>
<td>Jerome Lewis, Professor of Computer Science</td>
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<tr>
<td></td>
<td>Visual Narrative in Graphic Design and New Media</td>
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<td></td>
<td>Marius Valdes, Assistant Professor of Graphic Design</td>
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<td>Foreign Languages meet Sustainable Development: A Pedagogical Reorientation</td>
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<td>for a Competitive Future</td>
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<td>Douglas Jackson, Instructor of Spanish</td>
</tr>
<tr>
<td></td>
<td>Senior Exhibition Catalogue</td>
</tr>
<tr>
<td></td>
<td>Mollie Brown, Graphic Design Major</td>
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<tr>
<td></td>
<td>(Advisor: Lisa Anderson, Associate Professor of Graphic Design)</td>
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<tr>
<td>10:45am-11:00am</td>
<td>Break / Poster Viewing</td>
</tr>
</tbody>
</table>
### Session III: Biology, Bioinformatics, and Informatics

**Session Chair: Chioma Ugochukwu, Assistant Professor of Journalism**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
</table>
| Absorption of Coliphage T4 to Clay Particles | Jennifer Cowan, Biology Major  
(Advisor: Jack Turner, Professor of Biology) |
| Clustering Support Vector Machines for Protein Local Structure Prediction | Wei Zhong, Assistant Professor of Computer Science |
| Protein Localization of SLC26A2 (DTDST) in Rat Kidney | Jeannie Chapman, Assistant Professor of Biology |
| Data Confidentiality versus Chase | Angelina Tzacheva, Assistant Professor of Informatics |

**Lunch (Cafeteria - Campus Life Center)**
*Everyone is welcome. ALL PRESENTERS EAT FREE!!!*

### Session IV: Rights, Justice, and Politics

**Session Chair: Steve Caldwell, Assistant Professor of Management**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Chioma Ugochukwu, Assistant Professor of Journalism</td>
</tr>
<tr>
<td>Jeopardizing US Energy Security</td>
<td>Jorge Salvo, Assistant Professor of Spanish</td>
</tr>
</tbody>
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| Sergio Giral & The Other Francisco: the Denunciation of Romantic Myths in Cuban Slavery | Zachary Snow, English Major  
(Advisor: June Carter, Professor of Spanish) |
| Battling for the Temple of Liberty: Robert Brown Elliot and Alexander Stephens Debate the Civil Rights Act of 1875 | Kevin Sargent, Assistant Professor, Speech & Director, Forensics |

**Break / Poster Viewing**

### Session V: Human Health and Interaction

**Session Chair: Muhammad Hameed, Assistant Professor of Mathematics**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influence of Age on Volunteer Contributions in a Nonprofit Organization</td>
<td>Steve Caldwell, Assistant Professor of Management</td>
</tr>
</tbody>
</table>
| "Death’s Day Off" | Zachary Snow, English Major  
(Advisor: Jorge Salvo, Assistant Professor of Spanish) |
<p>| Discovering Lived Experience through Heuristic Inquiry | Gayle Casterline, Associate Dean of Nursing |</p>
<table>
<thead>
<tr>
<th>Time</th>
<th>Session VI: Human-Machine Interaction and Mathematical Modeling (II)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:45pm-4:00pm</td>
<td><strong>Mathematical Modeling of Liquid Jets: Theory and Experiments</strong></td>
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<td><em>Muhammad Hameed, Assistant Professor of Mathematics</em></td>
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<td><strong>Vision-Based Control of Robots Playing Pong</strong></td>
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<td><em>Derrick Thompson, Computer Science Major</em></td>
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<tr>
<td></td>
<td>(Advisor: Sebastian van Delden, Assistant Professor of Computer Science)</td>
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<td><strong>Fourier Series Solution of a Stable Heat Conduction Problem</strong></td>
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<tr>
<td></td>
<td><em>Frank Darwin, Mathematics Major</em></td>
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<th>Closing Remarks</th>
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<td>4:45pm</td>
<td><em>Sebastian van Delden, Symposium Chair</em></td>
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**POSTER SESSIONS**

Session Times: 9:30am-9:45am; 10:45am-11:00am; 2:30pm-2:45pm; 3:45pm-4:00pm

**Cochlespira (Turridae, Gastropoda) in the Neogene and Recent of the Western Atlantic**
*Lyle Campbell, Professor of Geology; Sarah Campbell, Instructor of Biology*  
Matthew Campbell; and David Campbell

**Surgical and Non-Surgical Physical Therapy Patients: Differences in Anxiety, Depression and Mood**
*Lyman Keller, Psychology Major*  
(Advisor: Kim Purdy, Associate Professor of Psychology)

**Distributed Fractal Generation: The Mandelbrot Set**
*Michael Blackmon, Mathematics Major*  
(Advisor: Kelly Waters, Assistant Professor of Mathematics)

**The Effects of Obesity on Vascularity of Heart and Brain of Zucker Rats**
*Tia Pilikian, Jessica Clark, Sam Subramanian, Biology Majors*  
(Advisor: Jeanne Kowalczyk, Professor of Biology)

**Use of the Polymerase Chain Reaction to amplify the actin gene from the snail, Biomphalaria glabrata**
*LeAnna Ledford, Biology Major*  
(Advisor: Vince Connors, Professor of Biology)
Towards the Partial Calibration of an Eye-in-Hand Visually-Guided Robotic Manipulator

Sebastian van Delden
svandelden@uscupstate.edu

Eye-in-hand visually guided robotic manipulators are robotic arms that have one or more cameras mounted to their end effector. In automation tasks, a manipulator's work cell must be very carefully controlled because the robotic system usually lacks the sensor information needed to determine where random parts, tools, and obstacles are located. Using visual information, a camera guided manipulator attempts to overcome such problems. "Visual servoing" (a popular area of research) is a closed-loop control method employed by many visually guided eye-in-hand systems which relates image space to joint space by computing the inverse of a Jacobian matrix - a two dimensional array of partial derivatives. In the USC Upstate Robotics and Intelligent Systems Laboratory, we have six Staubli RX60 manipulators which were donated to us by the Staubli Corporation. These machines have the built-in capability of moving (translating and rotating) with respect to the robot's world coordinate system. Utilizing this capability, we have been developing algorithms that automatically align the camera coordinate system with the robot's world coordinate system. These algorithms would facilitate visually guiding an eye-in-hand system without the need for a Jacobian matrix. We present an overview of our methodology and the current status of the work.

Instability Involving Taylor Series Solutions of a Heat Conduction Problem

Ricky Farr and Gamal Elnagar
{refarr, gelnagar}@uscupstate.edu

A direct method for solving a heat conduction problem using Taylor series is discussed. Properties of Taylor series are briefly presented. It is shown that the implementation of Taylor series for this problem involves the use of an ill-conditioned matrix. Numerical results are included to illustrate instability in the approximate solution.

Is there no more to Reality than the Superposition of Poly-Emergent Signatures?

Ron Fulbright
rfulbright@uscupstate.edu

During the past twenty-five years, research in complex systems and non-linear dynamics has demonstrated that systems produce emergent global behavior arising as a natural consequence from the interaction between the parts of the system. All systems would produce emergent behavior if they were allowed to do so. However, human engineering usually constructs systems with system dynamics tuned down to the point where emergence is squelched. Only recently are researchers and practitioners purposely loosening system behavior to facilitate emergence. This is happening in fields not traditionally associated with complex systems research such as organizational management. Branching out into other disciplines brings complexity researchers face-to-face with new dynamical factors. One such factor is the importance of the notion of "distance." Systems, when managed and controlled from different distances produce different emergent behaviors. Systems producing multiple emergent behaviors in this way are called poly-emergent systems and their dynamic behavior is called the emergent signature. It turns out that everything we know about a system is a result of its emergent signature. This presentation shows how any system can be described by the superposition of the system’s poly-emergent signatures and discusses the implications for fields like social informatics, organizational behavior, and human organization management.
Enhancing Machine-Human Interaction through Grammatical Awareness
Shea Menge and David Marlow
{smmenge, dmarlow}@uscupstate.edu

Non-human systems’ participation in human interaction has been scrutinized since Ryle’s (1949) discussion of the ghost in the machine. With the advent of computer systems, this concept rose to a new level with many programs attempting to emulate and facilitate human communication and behavior. One such program is Joseph Weizenbaum’s ELIZA (1966). ELIZA was designed to reproduce the Rogerian therapist in facilitating people’s self-awareness of issues that are troubling them. The computer parses a user’s statements, finds keywords, and attempts to construct relevant responses which will lead the user to explore their feelings at a deeper level as in the example below:

User: *My boyfriend made me come here*
ELIZA: *Your boyfriend made you come here?*

User: *He says I’m depressed much of the time.*
ELIZA: *I’m sorry to hear you are depressed.*

While ELIZA is able to emulate the therapist in response to many statements, it fails with others. This study set out to see if it were possible to identify causes of failure in terms of grammatical structures. The methodology involved reviewing the transcripts of twenty ‘therapy sessions’ between Eliza and participants recruited for this study. Participants were asked to continue with their session until communication broke down. These ‘break-down points’ were then examined to discern cause of failure. The “I am + Qualifier” construction was found to be the cause of 30% of the failures. To alleviate this problem, the code has been modified to include an array of qualifiers which are then deleted from ELIZA’s response. Preliminary data suggests reduction of failure in these constructions. While ELIZA is a simple program, it does interact with humans and enable human rhetoric in meaningful ways. This study shows that grammatical structures are key in enabling computers to emulate human rhetoric.

| Session II: Instructional Methods and Resources |

An Electronic Database of Templated Problems for Pre-Calculus
Jerome Lewis
jlewis@uscupstate.edu

The project, about 65% complete, calls for the design of a database of 100 problem templates, each with a C++ program that generates random instances of the problem in multiple choice format. A total of 7 students have worked on this project. The project will be used to support the instruction of pre-calculus courses. To give the reader an idea of what a template problem actually is, consider the following question:

How many real numbers satisfy the following equation: \(|5x^2 - 2x + 4| = |7x + 3|\)

(a) 0
(b) 1
(c) 2
(d) 3
(e) 4
This is an instance of a problem designed to test a student’s ability to solve absolute-value equations involving a mix of linear and quadratic expressions. This particular instance was created by executing the program containing the template for this problem. Every time the program is executed it creates a different instance of the problem, and in this way the student/teacher has an unlimited supply of these questions, not merely one or two. The program must not only give new instances each time, but it must also create a list of 1 correct (randomly placed) answer along with 4 incorrect (yet believable) answers. The goal is to have a graphical user interface with an abundance of easy-to-use features that will allow teachers to use the product for on-line practice problems, tests and assessment.

Visual Narrative in Graphic Design and New Media
Marius Valdes
mvaldes@uscupstate.edu

Visual storytelling is a significant and pervasive means of communication in our culture. This form of storytelling continues a narrative tradition at a time when non-linear thinking and hybrid forms of visual communication are the norm. Many visual communicators are using imagery and graphic styles to address difficult, controversial subject matter that would be hard to represent in normal realistic depictions. Issues that range from sexual orientation to the atrocities of war to racial prejudice are expressed visually through a variety of media, including painting, sculpture, animation, “zines”, graphic design, comic strips, and graphic novels. Graphic designers are using traditional and non-traditional mediums for visual narratives in new ways utilizing modern technologies, ideas, and visual language with successful results. As a design educator, I find it important to teach my students by example through my professional practice. My research presentation will explore one of my recent projects in which visual narrative was used to visually communicate a complex idea to a specific audience. The presentation will show the process from concept to completion.

Foreign Languages meet Sustainable Development: A Pedagogical Reorientation for a Competitive Future
Douglas Jackson
djackson@uscupstate.edu

The sustainable revolution is underway world wide. Successful international companies recognize the need to create business plans that address social, political, and environmental problems in order to facilitate economic integration for the long term benefit of the global community, not just their bottom line. However, higher education in the US, and foreign languages in particular, have been slow to adjust programs to incorporate sustainable development themes (ESD). The problematic nature of defining sustainable development has impeded curricular reorientation of foreign language course content. This presentation will provide participants with an in-depth look at developmental terminology for incorporation into writing assignments and oral presentations for beginning, intermediate, and advanced levels of Spanish at USC Upstate. Through this process, language students obtain interdisciplinary business language skills that address social, political, environmental, and economic problems that accompany globalization. Handouts will demonstrate practical standards-based approaches for incorporating writing themes, oral presentations, and cultural content for sustainability so that educators may better train students for careers that require technical language proficiency across disciplines.
Senior Exhibition Catalogue
Mollie Brown, Lisa Anderson, Marius Valdes, and Rebecca Lamb
{mebrown, landerson, mvaldes, rdlamb}@uscupstate.edu

We, the graduating BFA candidates of the University of South Carolina Upstate, plan to bring awareness of the Art programs offered at the university to the Greenville-Spartanburg area. In observing previous exhibitions at the university, we discovered the benefits of designing the senior exhibition catalogue. We consider our work to represent the most diverse group to complete the Graphic Design program thus far. The exhibition, catalogue and symposium are all opportunities and challenges for us as a group to establish unity within separation. We have begun the composition of the catalogue, the purpose of which is to separate us as individual students, while also showcasing ourselves as a team of talented designers. Last semester we each presented concepts for the catalogue. From these concepts we arrived at a solution of utilizing color themes to express individuality. Each participant will be distinguished by color and will display their own panel of artworks within the catalogue. The color themes will diversify the individual artist, while the panel layout will remain consistent. The format of the catalogue will be 3 panels, front and back, each panel devoted to a BFA candidate with a cover designed through collaborative efforts. Overall our presentation at the symposium will consist of each student speaking about our conceptual design and the processes involved in both the catalogue and postcard mailer. We will have a supporting Power Point presentation to visually assist us in showing the audience the stages involved in publishing a printed piece in a group situation. Through our symposium presentation, our main goal is to inform the public and invite both future cliental and future students to assess the designs that represent the culmination of our education at the University of South Carolina Upstate.

Session III: Biology, Bioinformatics, and Informatics

Absorption of Coliphage T4 to Clay Particles
Jennifer Cowan and Jack Turner
{jbcowan, jturner}@uscupstate.edu

It has been determined that bacteria are adsorbed by clay particles (Franco, 2006) and this knowledge is used in the water treatment process as a means to settle out bacteria from effluent. This results in the bacteria being returned along with other waste to water sources near the plant. This creates the potential for the bacteria to infect humans when livestock or crops irrigated with the contaminated water are consumed. In this study we determined that the coliphage that invades the enteric bacteria Escherichia coli is also adsorbed by clay particles. We suggest that the phage could be used to lyse and therefore remove the bacteria that sediments out during the treatment process, eliminating them rather than recycling them.

Clustering Support Vector Machines for Protein Local Structure Prediction
Wei Zhong
wzhong@uscupstate.edu

Understanding sequence-to-structure relationship is a central task in bioinformatics research. Adequate knowledge about this relationship can potentially improve accuracy for local protein structure prediction. One of approaches for protein local structure prediction uses the conventional clustering algorithms to capture the sequence-to-structure relationship. The cluster membership function defined by conventional clustering algorithms may not reveal the complex nonlinear relationship adequately. Compared with the conventional clustering algorithms, Support Vector Machine (SVM) can capture the nonlinear sequence-to-structure relationship by mapping the input space into another higher dimensional feature space. However, SVM is not favorable for huge datasets including millions of samples. Therefore, we propose a novel computational model called CSVMs (Clustering Support Vector Machines). Taking advantage of both theory of granular
computing and advanced statistical learning methodology, CSVMs are built specifically for each information granule partitioned intelligently by the clustering algorithm. This feature makes learning tasks for each CSVM more specific and simple. CSVMs modeled for each granule can be easily parallelized so that CSVMs can be used to handle complex classification problems for huge datasets. Average accuracy for CSVMs is over 80%, which indicates that the generalization power for CSVMs is strong enough to recognize the complicated pattern of sequence-to-structure relationships. Compared with the conventional clustering algorithm, our experimental results show that accuracy for local structure prediction has been improved noticeably when CSVMs are applied.

Protein Localization of SLC26A2 (DTDST) in Rat Kidney
Jeannie Chapman
jchapman@uscupstate.edu

The SLC26 family represents a group of integral membrane anion transport proteins. Mutations in one member of this protein family, SLC26A2 (DTDST or diastrophic dysplasia sulfate transporter), result in a range of chondrodysplasias due to undersulfation of proteoglycans in chondrocytes, a major site of DTDST protein expression. DTDST mRNA had previously been detected in the kidney, but protein expression had not been characterized. Our objective for this study was to determine the protein localization of this sulfate transporter in the kidney. We used immunofluorescence (IMF) techniques with an anti-DTDST monoclonal antibody to examine kidneys harvested from adult rats. Double labeling was also performed with antibodies directed against megalin, which is found in the brush border membrane and coated pits of the proximal tubule. IMF analysis indicates that DTDST protein expression is limited to the brush border membrane of proximal tubule cells in the renal cortex. DTDST expression was not detected in glomeruli or other nephron segments. DTDST was also detected in isolated rat kidney proximal tubule microvillus membranes by Western blot analysis, confirming the immunofluorescent localization of the DTDST transporter to this nephron segment. The functional role of the DTDST protein in the kidney is unknown, but it may play a role in proximal tubule sulfate transport.

Data Confidentiality versus Chase
Angelina Tzacheva
atzacheva@uscupstate.edu

In this paper, we present a generalization of a strategy proposed by Im et.al. that allows to reduce a disclosure risk of confidential data in an information system S using methods based on knowledge discovery. The method proposed by Im et.al. protects confidential data against Rule-based Chase method - a null value imputation algorithm driven by certain rules, as proposed by Dardzinska and Ras. This method identifies a minimal subset of additional data in S, which needs to be hidden to guarantee that the confidential data are not revealed by Chase. In this paper we propose a bottom-up strategy, which identifies, for each object x in S, a maximal set of values of attributes which do not have to be hidden and still the information associated with secure attribute values of x is protected. It is achieved without examining all possible combinations of values of attributes. Our method is driven by classification rules extracted from S and takes into consideration their confidence and support.
Gendering the Problem, "Class" ifying the Blame: Intimate Partner Violence in Tyler Perry’s Movies
Chioma Ugochukwu
cugochukwu@uscupstate.edu

This article employs a feminist perspective and Nancy Bern’s discourse on women and violence to critique two blockbuster movies by Tyler Perry. The author argues that Perry’s perspective on intimate partner violence in “Madea’s Family Reunion” and “Diary of a Mad Black Woman” aligns with feminist scholars’ position by gendering intimate partner violence as a “male thing” rather than a “human thing.” However, Perry’s perspective also veers from feminist positions by problematizing intimate partner violence as a “professional male thing.” This Perry does by failing to exclusively foreground such violence as an issue that arises because of the gender power differentials in intimate relationships.

There has always been a divide between feminist scholars and sociologists when it comes to critiques of intimate partner violence. Current research on intimate partner violence illuminates this divide because feminist researchers attribute such violence to the underlying problems of patriarchy or what Kristin Anderson (1997) describes as “part of a system of coercive controls through which men maintain societal dominance over women.” Family violence researchers, on the other hand, de-gender the problem by blaming other socio-demographic factors such as age, socio-economic status, and unemployment. But even while allowing for this variance, when socio-economic factors are considered in intimate partner violence, current research suggests that such violent tendencies are more prevalent among men with lower SES than those with higher SES. Tyler Perry, however, lays the blame squarely at the professional upper class African-American male, as opposed to the working class male.

This author argues that Perry’s framing of intimate partner violence as a “professional male thing” or a “bugee thing,” while not normalizing such violence, obscures working class men’s role and minimizes cultural and structural factors that propel such violence. Considering Nancy Bern’s (2001) assertion that the images of intimate partner violence are constructed and reproduced in the media and that individuals could mould their own conceptions of reality or what Aaron Cicourel (1968) terms “background expectancies” through media exposure, Perry’s “class” ification of intimate partner violence becomes problematic. This is because that framing could inadvertently lead some black women to danger by fostering the myth that intimate partner violence is alien to working class neighborhoods, and that black women have a better chance of bliss with a blue collar black man than his educated, professional counterpart. This is because his movies suggest that the working class man comes to “restore.”

Jeopardizing US Energy Security
Jorge Salvo
jsalvo@uscupstate.edu

In the last three or four years Equatorial Guinea has increased its oil production to almost 500,000 barrels per day, transforming this small Spanish speaking African country into one of the biggest oil producers in Africa. The oil has given to this country, according to the CIA’s World Facts Book, one of the highest per capita incomes of the world, second only to Luxembourg. Despite these numbers, or perhaps because of them, Equatoguineans live in some of the worst conditions of poverty in Africa. The dictatorial government of Equatorial Guinea has one of the worst records in Human Rights by any measure and corruption is second to none. An investigation on money laundering conducted by the US Senate a few years ago unveiled personal banking accounts in the Riggs Bank for the amount of 700 million dollars in the name of Teodoro Obiang Nguema, Equatorial Guinea’s President. Because these accounts and other of the late Chilean dictator
Augusto Pinochet, the Riggs Bank was fined several million dollars for incompliance with money laundering regulations, but nothing was done with Obiang’s money. This year, Obiang was received by Secretary of State Condoleezza Rice and greeted as a good US friend. Exxon Mobil, Texaco, Amerada Hess and other oil related American companies have invested billions of dollars in Equatorial Guinea many times in “joint ventures” with local companies owned by the dictator or his family. These ventures in which American companies put the capital and their Equatoguinean counterparts receive part of the profits constitute a barely indirect way to pay bribes and offer kickbacks. Many American institutions, such as the University of South Carolina, have agreed to programs of exchange with their counterparts in Equatorial Guinean offering scholarships or other benefits that are used by the government as a form of compensation for the highest rank of the dictatorship apparatus. This paper proves that this way to conduct the US foreign relation seriously jeopardizes the capabilities of our country to maintain an acceptable degree of energy and political security in the near future. By “defending the devils” of today, the US is alienating any potential friend of tomorrow.

Sergio Giral & The Other Francisco: the Denunciation of Romantic Myths in Cuban Slavery
Zachary Snow and June Carter
{zmsnow, jcartier}@uscupstate.edu

This presentation will be based on the research I have conducted, under the supervision of Dr. June Carter, about the Sergio Giral film "The Other Francisco," which denounces the romantic myths about Cuban slavery presented by its source, Suárez y Romero's novel "Francisco." Our mission is to emphasize the importance of filmmakers like Giral, who use their cinematic art to educate viewers about misrepresented aspects of their culture's history. Dr. Carter's work will emphasize Giral's narrative technique, while my contribution will focus primarily on the technical aspects of Giral's film. Although his name may not be as familiar to international film buffs as Fellini or Bunuel, director Sergio Giral is perhaps the single most important and influential Afro-Cuban filmmaker of all time. His short films, features, and documentaries primarily deal with the struggles of Cuban slaves, with the main purpose of dismissing romanticized notions about the history of slavery in his country. Giral's best known film, The Other Francisco (1975), is an adaptation of the popular Cuban novella from 1838, the equivalent of Uncle Tom's Cabin in the United States. Giral contrasts the romanticism of the novel with the harsh realities of slavery through his mixture of Hollywood-inspired romance and a cinema verite style which exposes the superficiality and inaccuracies of his source. He does this with the gradual evolution of his narrative, the utilization of numerous cinematic tricks (the use of high and low angles, narrative montage, mixture of a romantic style with a more realistic one) with symbolic significance, and an obsession with authenticity which results in one of the most unique and historically relevant examinations of Cuban slavery on film.

Battling for the Temple of Liberty: Robert Brown Elliot and Alexander Stephens Debate the Civil Rights Act of 1875
Kevin Sargent
ksargent@uscupstate.edu

Robert Brown Elliott was one of the first African Americans elected to Congress from South Carolina during the Reconstruction period. While serving in the House of Representatives he participated in one of the most famous floor debates in congressional history when he squared off against the Alexander Stephens--former Vice President of the Confederacy--over passage of the final Civil Rights Act of 1875. The arguments in the debate focused on the meaning of the Civil War and the constitutionality of reconstruction. This paper examines how Elliott deployed a persuasive metaphor of the "temple of liberty" to justify passage of the Civil Rights Act and create continued support for reconstruction.
Session V: Human Health and Interaction

The Influence of Age on Volunteer Contributions in a Nonprofit Organization
Steve Caldwell
scaldwell@uscupstate.edu

This study examines the role of chronological age and age diversity in relation to the effects of organizational influences on the contributions of 458 volunteers in 74 geographically dispersed teams of a large nonprofit organization. The results indicate that the quality of member selection has a greater positive influence on in-role performance for older rather than younger volunteers, that the quality of training for group members has a greater positive influence on in-role performance for volunteers who are less dissimilar in age from others in the group, and that the positive effects of chronological age on helping behaviors depends on the mean age of the group such that it is stronger for groups with older age means. The findings are discussed along with their practical implications.

"Death’s Day Off"
Zachary Snow and Jorge Salvo
{zmsnow, jsalvo}@uscupstate.edu

We present a student film entitled “Death’s Day Off” in collaboration with Dr. Jorge Salvo and other students at USC-Upstate. Pre-production for this film, including the acquisition of participants and the scouting of locations, has already started and the actual production should begin around Spring Break. We have already obtained a grant of $300 from the Department of Undergraduate Research and should use this to acquire equipment, secure locations, and develop special effects. This production should be completed by April or May, at which time we plan to showcase it in various film festivals, first locally and then nationally. As a production of the University’s Student Film Guild, our film will be the partial property of USC-Upstate and can be used and screened by the University as needed. “Death’s Day Off” is a short film which should run between 5 and 10 minutes. The plot focuses on the relationship between a factory worker and the young boy he becomes a father figure to after leaving his job. Themes involving the loss of childhood innocence and the nostalgia associated with achieving adulthood will be explored, while the film’s twist ending is both dark and symbolic. A copy of the screenplay will be provided as needed, we will be willing to meet and discuss the production at any time.

Discovering Lived Experience through Heuristic Inquiry
Gayle Casterline
gcasterline@uscupstate.edu

The nature of heuristic inquiry is phenomenological, originating as a process of internal search through which one discovers the nature and meaning of human experience. The purpose of the method is to come to know more fully what something is and means; the researcher discovers a new way to see and understand the phenomenon of interest. There are six steps to the process: initial engagement, immersion, incubation, illumination, explication, and creative synthesis. Heuristic inquiry is not limited to first-person narratives, but may also include a collection of stories, poems, personal diaries, music, artwork, and other personal documents that depict the experience. The purpose of this presentation is to discuss how heuristic inquiry allows the researcher to become intimately and autobiographically related to the research question, ultimately creating an atmosphere of connection and engagement that inspires participants to express, explore, and explicate the meanings that are within their experience. The presenter will use examples from personal research in prayer and health, and demonstrate the use of imagination and insight to
assemble an aesthetic rendition of the themes and essential meanings of the phenomenon through poetry and music.

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**All Resources Exhausted: An Analysis of Adolescent Depression and the Resources Available and Promoted among National, State and Local Agencies**

*Shawn Maxwell and Kendra Ogletree-Cusaac*

samaxwell@uscupstate.edu; ogletree@gwm.sc.edu

Focusing on the experiences of adolescents with depression, it has become apparent that adolescents are in dire need of support from all possible sources. Many young men and women who have committed some of the most heinous and destructive acts among their age group exhibit feelings of depression and low self-esteem. It is possible that adolescents who spend time in therapy and counseling have a greater chance to elude the pull of depression and crime. This research will examine the prevalence, outcomes, and further implications adolescents whose depression goes untreated. There will also be an examination of the available resources, via community agencies and organizations, for adolescents battling depression. The research will investigate the accessibility of these resources and what barriers or limitations that adolescents face when pursuing help and treatment for depression. Depression in adolescents can manifest themselves differently than in adults, therefore it is important that resources be evaluated in regards to the benefits and strengths they yield for adolescents specifically. There will be an identification of the methods of treatment that have the most support in the literature as most effective and applicable an attempt to provides evidence for more active solicitation of aid and support from all possible sources. Left untreated, depression can be debilitating as an adult and can lead to other illnesses and diseases. Thus, the research will also evaluate mental illnesses that commonly co-exist with depression among adolescents.

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**Session VI: Human-Machine Interaction and Mathematical Modeling (II)**

**Mathematical Modeling of Liquid Jets: Theory and Experiments**

*Muhammad Hameed*

mhameed@uscupstate.edu

Surface tension driven motion of a liquid jet has a fundamental importance in fluid mechanics and arises in a wide array of applications including ink-jet printing, fiber drawing and fuel injection processes. In this presentation, I will talk about the mathematical model which I developed to study the instability and breakup of a fluid jet with variable surface tension due to the presence of surfactants. The derivation of the model is based on the slender body theory and long wave asymptotic analysis. It is found that the presence of surfactants retards the breakup process. The predictions of this simplified model are in good agreement with full numerical simulations and experimental results.

**Vision-Based Control of Robots Playing Pong**

*Derrick Thompson, Jose Reyes, and Sebastian van Delden*

{dmthompson, jlreyes, svandelden}@uscupstate.edu

We present a unique eye-in-hand robotic system that tracks a ping-pong ball’s position and direction as it approaches a manipulator’s work envelope. The overall objective of this work was to develop a man-versus-machine game of pong. Two Staubli RX-60 robotic manipulators were spaced 1940mm apart with a flat playing surface between them. One of the robots was completely autonomous (using a USB camera and computer vision algorithms to control its movements), while the other was controlled by a human (utilizing a graphical interface that offered fairly simple control
of the machine). Small hoses attached to the robots’ end effectors discharged 32 PSI of compressed air which propelled the ping pong ball back toward the opponent when it came too close to the end effector. The computer vision algorithms that we developed estimated the trajectory of the ball in order to determine the ball’s position when it was within the robot's reach. This trajectory algorithm utilized positional information of the ball in the camera display and the physical location of the ball on the playing surface. We also developed a socket communication program that enabled our camera and vision algorithms that were implemented in Java to seamlessly communicate with the robot control algorithms which were implemented with V+. Currently the system is working and can sometimes achieve about five returns during a volley against a human player. However, the system often fails because of two main technical problems: reaction speed and camera field-of-view. In our presentation, we will further discuss the computer vision algorithms and the problems we encountered while developing this system.

**Fourier Series Solution of a Stable Heat Conduction Problem**

*Frank Darwin and Gamal Elnagar*

{fsdarwin, gelnagar}@uscupstate.edu

An approximate method based on a Fourier series for solving a heat conduction problem is discussed. Properties of Fourier series are briefly presented and an operational matrix is developed and utilized to ensure stability of the solution. Numerical results are included to illustrate stability of the solution.

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**Poster Abstracts**

*Cochlespira (Turridae, Gastropoda) in the Neogene and Recent of the Western Atlantic*

*Lyle Campbell, Sarah Campbell, Matthew Campbell, and David Campbell*

{lcampbell, scampbell}@uscupstate.edu

The genus *Cochlespira* contains a strikingly sculptured group of small to medium sized, sharply keeled, fusiform marine snails. The genus arose during the Paleocene of Europe and of the North American Gulf Coast. *Cochlespira* species were well represented in the Eocene to Miocene of Europe, Australia, New Zealand, Eastern North America and the Indo-Pacific, but were rare in younger fossil deposits. This study reports first records of the genus in the Miocene Chipola and Shoal River Formations of western Florida, and from the Pliocene deposits of Virginia, South Carolina, Georgia, and southern, eastern, and western Florida. Of the six undescribed fossil species which can be documented in these deposits, the Virginia and South Carolina material was discovered during our field studies, and the Georgia material came through our collaboration with field workers in the Brunswick area who ship unidentified bulk material to us.

All Recent species typically inhabit waters deeper than 100 meters. Nine are found in the tropical and subtropical waters of the Indo-Pacific, a single tropical species is found in the Eastern Pacific, and the literature reports three species and a subspecies from the Western Atlantic tropical waters. We can now report an additional Western Atlantic species based on material from deeper waters off Colombia which may be the first Recent record of *Cochlespira reeveii* Olsson, 1942, a species previously known only as a fossil from Western Costa Rica.
Surgical and Non-Surgical Physical Therapy Patients: Differences in Anxiety, Depression and Mood  
Lyman Keller and Kim Purdy  
{bkeller, kpurdy}@uscupstate.edu

Physical therapists help people with a wide range of athletic ability recover from surgical procedures or physical injuries. A typical first physical therapy session involves many tests and measurements to determine the nature and range of the physical limitation. No research has yet documented the effectiveness of physical therapy for surgical and non-surgical patients, or to determine any differences between these two populations. The purpose of this study was to investigate psychological differences between individuals who had physical therapy following a surgical intervention and individuals with other injuries not requiring surgery. Specifically, we wanted to determine if there was a difference in an individual's mood, anxiety or depression levels at the onset of physical therapy treatments. Nine participants (three males and six females) have thus far been recruited from the patient population at Carolina Orthopedic Center Physical Therapy in Greenville, S.C. A survey that measured aspects of depression, anxiety and mood was given to patients during their first visit to the physical therapy clinic. Initial analyses indicate that non-surgical patients were more depressed than surgical patients. As more patients are collected, differences in mood and anxiety may serve to distinguish surgical from non-surgical patients. If the hypotheses are supported, this may be the first indication that treatment plans ought to reflect the surgical/non-surgical history of the physical therapy patient.

Distributed Fractal Generation: The Mandelbrot Set  
Michael Blackmon and Kelly Waters  
{msblackmon, kwaters}@uscupstate.edu

The parallelization of any computational task is no small feat. We have chosen to focus on the parallelization of the task of computing the Mandelbrot set at high resolutions. To do this we first built a distributed computing cluster; then using this cluster we began to tackle the problem of computing the Mandelbrot Set. Through the use of parallel computing, and pseudo-intelligent scheduling we have been able to reduce the total amount of time needed to perform such a task.

The Effects of Obesity on Vascularity of Heart and Brain of Zucker Rats  
Tia Pilikian, Jessica Clark, Sam Subramanian, and Jeanne Kowalczyk  
{trpilikian, jaclark1, msubramanian, jkowalczyk}@uscupstate.edu

Obesity and overweight affect 65% of Americans. While most studies involve adults, childhood obesity has also increased dramatically. This condition is also accompanied by a number of health problems including hypertension, hyperlipidemia and Type II Diabetes. Previous research has included efforts to link obesity to a wide range of factors such as insulin resistance, increased vessel wall area and increased blood volume. Adipose tissue possesses a highly structured vascular system and increased tissue results in increased blood flow to the area. Conversely, higher vasoconstriction in skeletal muscle microvessels was seen in obese Zucker rats (OZR) compared to lean Zucker rats (LZR). It was also found that young obese rats with long-term high fat diets (8 weeks and beyond) expressed a higher blood pressure than that of lean rats. Previous research at USC Upstate has indicated that a decrease in heart and brain blood vessels has been found in OZR. This project consisted of two components; 1) to determine if there was a link between low vascularity and high blood pressure and 2) to determine if a difference in vascularity existed in heart and brain tissue of OZR and LZR. A large part of this research project involved performing standard paraffin-embedding of heart and brain tissue from OZR and LZR with hematoxylin and eosin stains. The preserved heart and brain tissues that were used for slide preparation were obtained from the laboratory of D.W. Stepp at the Medical College of Georgia.
where animal protocols were followed. After slide preparation, visual enumeration of blood vessels from OZR and LZR tissues were made. Data were analyzed by Student's T tests.

Use of the Polymerase Chain Reaction to amplify the actin gene from the snail, *Biomphalaria glabrata*

LeAnna Ledford and Vince Connors
 lleford, vconnors}@uscupstate.edu

*Schistosoma mansoni* is a trematode parasite that uses the freshwater snail, *Biomphalaria glabrata*, as an intermediate host, and causes the disease, schistosomiasis. We are currently using *B. glabrata* embryonic cells (Bge cells) to develop a protocol to extract DNA from the cells to be used in a PCR reaction to amplify the actin gene. Previously, we were unable to extract a sufficient amount of DNA to use in the PCR reaction. Changes to the protocol included an extended incubation time with Proteinase K and precipitation of the DNA with isopropanol. These changes increased the overall yield of DNA from the Bge cells. The DNA was then quantified using a Diode array UV-vis spectrophotometer and used in a PCR reaction with universal actin primers and visualized using horizontal agarose gel electrophoresis.