22nd Annual Student Scholarship Expo

Business Sciences
Visual Arts
Performing Arts
Natural Sciences
Individuals & Societies
Computer Sciences
Engineering
Mathematical Sciences
Human Service

April 17, 2014
Renaissance Coliseum
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2014 Expo Sponsored by:
The Center for Teaching Excellence & Learning
The Office of Sponsored Programs
Provost & Vice President for Academic Affairs
Associate Provost for Research & Dean of the Graduate School
22ND ANNUAL STUDENT SCHOLARSHIP EXPO
April 17, 2014 / Renaissance Coliseum

~Schedule~

Students at displays for Public Poster Viewing Session, 2:00PM - 5:00PM

2014 Student Expo Award Ceremony, 6:00PM

- Welcome by Dr. Kevin Randall
  Interim Executive Director, Center for Teaching Excellence & Learning

- Announcement of Distinguished Graduate Scholarship Prize, presented by
  Dr. Jeff Bakken, Associate Provost for Research and Dean of the Graduate School

- Announcement of Dr. Alfonse and Nancy Masi International Scholars Award, presented by
  Dr. Jeff Bakken, Associate Provost for Research and Dean of the Graduate School

- Announcement of Honorable Mention Awards, presented by
  Dr. Jihyun Kim, 2013 First Year Faculty Award Recipient, Institute of International Studies
  Dr. Kevin Randall, Interim Executive Director, Center for Teaching Excellence & Learning

Dean’s Awards

College of Education and Health Sciences, by Dr. Lori Russell-Chapin
Foster College of Business Administration, by Dr. Jeff Bakken
College of Liberal Arts and Sciences, by Dr. Stacey Robertson
College of Engineering and Technology, by Dr. Julie Reyer
Slane College of Communications and Fine Arts, by Dr. Jeffrey Huberman

Provost’s Awards, by Dr. David Glassman

President’s Awards, by Dr. David Glassman
~ 2014 Expo Judges ~

Business Sciences

Amy Fairfield-Doering, Bradley, Department of Finance and Quantitative Methods
Ondrej Hora, Caterpillar, Inc.
Ken Klotz, Turner Center for Entrepreneurship
Julie Schifeling, Bradley, Institute for Principled Leadership in Public Service
Amit Sinha, Bradley, Department of Finance and Quantitative Methods

Human Services

Jessica Chandler, Bradley, Lewis J. Burger Center for Student Leadership and Public Service
Janet Forinash, Professional Therapy Services, Inc
Sarah Fuller, OSF Outpatient Physical Therapy at Glen Park
Lyndsey Hawkins, Bradley, Wellness Programs
Stephanie Hayes, OSF Physical Therapy
Nicole Meyer, Bradley, Pre-Law Center
Brenda Pratt, Bradley, Physical Therapy & Health Science
Kevin Randall, Bradley, Department of Family and Consumer Sciences
Eric Sparks, Professional Therapy Services, Inc.
Stephanie Zutter, Physical Therapist Peoria Public Schools

Individuals & Societies

Elizabeth Blair, Peoria Police Department /Dept. of Criminal Justice at University of Illinois-Springfield
Daniel Getz, Bradley, Department of Philosophy & Religious Studies
Stephen Peterson, Bradley, Department of Leadership in Education, Human Services, and Counseling
Angela Weck, Bradley, Department of International Studies, Peoria Area World Affairs Council
Kara Wolfe, Bradley, Hospitality Leadership Program
~ 2014 Expo Judges (cont.) ~

**Natural Sciences**

Jeff Bakken, Bradley, Associate Provost for Research, Dean of the Graduate School
Derek Behmke, Bradley, Department of Chemistry
Valerie Bennett, Bradley, Pre-Professional Health Advisory Center
Luke Haverhals, Bradley, Department of Chemistry
Anthony Hermann, Bradley, Department of Psychology
Megan Jaskowiak, Bradley, Sciences/Health Science Librarian
Keith Johnson, Bradley, Department of Biology
Jen Jost, Bradley, Department of Biology
Kevin Kimberlin, Bradley, Department of Physics
Ed Remsen, Bradley, Department of Chemistry
Sunita Shastry, Chaitanya Educational Foundation
Chad Stamper, Bradley, Technology Commercialization
Sandra Shumaker, Bradley, Office of Sponsored Programs
William Tammone, Provost, Illinois Central College
Yun Wang, Bradley, Department of Computer Science & Information Systems

**Engineering, Computer, & Mathematical Sciences**

Michael Appell, Research Chemist, Bacterial Foodborne Pathogens and Mycology Research, USDA-ARS
Jeff Bakken, Bradley, Associate Provost for Research, Dean of the Graduate School
Ed Brockway, Retired Caterpillar, Inc. Engineering Manager
Scarlet M. Daoud, Systems Engineer, Caterpillar, Inc.
Joe Driscoll, Bradley, Department of Electrical and Computer Engineering
Ahmad Fakheri, Bradley, Department of Mechanical Engineering
Deepak Gaddipati, VirtuSense Technologies
Sean Liu, Research Leader, Functional Foods Research Management Unit, USDA-ARS
Yufeng Lu, Bradley, Department of Electrical and Computer Engineering
Kalyani Nair, Bradley, Department of Mechanical Engineering
Engineering, Computer, & Mathematical Sciences (cont.)

Kevin Randall, Bradley, Director of Center for Teaching Excellence and Learning
Prasad Shastry, Bradley, Department of Electrical and Computer Engineering
Scott Post, Bradley, Department of Mechanical Engineering

Visual, Literary, & Performing Arts

Susan Brill de Ramírez, Bradley, Department of English
Laura Bruns, Bradley, Department of Communication
Daniel Getz, Bradley, Department of Religious Studies
Phil Luciano, Peoria Journal Star
Ji Young Kim, Bradley, Department of Communication
Jon Neidy, Bradley, Continuing Education and Professional Development Office
Stacy Peterson, Public Programming and Projects Assistant at the Peoria Public Library
Erin Schauster, Bradley, Department of Communication
James Rimington, Bradley, Department of Music
The Center for Teaching Excellence & Learning

Meet the Staff

G. Kevin Randall is the Interim Executive Director for the Center for Teaching Excellence and Learning and an Associate Professor in the Department of Family and Consumer Sciences. He teaches Introduction to Family & Consumer Sciences, Family Systems and Applications, and Family Relations. In addition to his service as director of the C.C. Wheeler Institute, his current research focuses on (a) the effects of a brief, family-focused intervention on academic success through growth factors of school engagement; (b) a comprehensive investigation of the Duke Older Americans Resources and Services Procedures-a multidimensional functional assessment of older adults, centenarians in particular; and (c) experiential learning in Family and Consumer Sciences (for example, ethics education and service-learning). His recent publications are found in School Psychology Quarterly and Gerontology. In addition to departmental and college service, Dr. Randall serves on Bradley’s General Education Committee.

Kim Willis is the Assistant Director of the Center for Teaching Excellence and Learning (CTEL). She began her career at Bradley in February 1998, previously serving in the Information Resources and Technology department for six years and then advancing to CTEL with her interests in collaboration in research and creative activities and working more closely with faculty and students. She is responsible for conducting activities to assist faculty with developing, coordinating, and administering internal grant funding programs. Kim also organizes and facilitates faculty development programs and services that offer professional development opportunities that enhance the quality of learning. She received her B.A. degree in Kinesiology from the University of Michigan, Ann Arbor where she received an athletic scholarship to play softball for the Wolverines. She received her M.A. degree in English from Bradley University. She and her husband, Enrico, have one daughter, Izadora.

Lauren Schmidt is the Graduate Assistant for the Center for Teaching Excellence and Learning. She is working toward her Masters in Human Developmental Counseling, specializing in school counseling here at Bradley. Lauren received her Bachelors Degree from Illinois State University in Psychology with a minor in Spanish. At ISU she was the President of the student organization that supported Expanding Your Horizons conferences, which helped spark young women’s interest in STEM careers. She also currently works at the Peoria Zoo as an educator.

Kelsey Tueth
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Office Support / Center for Teaching Excellence and Learning

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Programming and Technical Support
Graduate Assistant / Instructional Technology Assistance Center
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Derek Behmke, Mund-Lagowski Department of Chemistry & Biochemistry
Joseph Driscoll, Department of Engineering Physics
Ahmed Elshahat, Department of Finance & Quantitative Methods
Melinda Faulkner, Department of Biology
Daniel Getz, Department of Philosophy and Religious Studies
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Sandra Shumaker, Office of Sponsored Programs
Kim Willis, Center for Teaching Excellence & Learning
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Bradley Community Acknowledgements

Aramark Food Service

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A visit with Bradley Alumni,  
SARAH FULLER, DPT ’13 & EMILY PISANI, DPT ’13

The Center for Teaching Excellence and Learning is proud to recognize and celebrate two outstanding alumni, both 2013 graduates of Bradley’s Doctorate of Physical Therapy (DPT) program. Sarah Fuller and Emily Pisani conducted research under the guidance of their advisor, Dr. Brenda Pratt of the Physical Therapy and Health Science Department. Sarah and Emily’s collaborative project with Dr. Pratt titled, “The Effect of Playground Environments on the Physical Activity and Support Needs of Ambulatory Children with Cerebral Palsy,” won the President’s Award at the 2012 Graduate Student Scholarship Expo. Their research focused on the comparison of playground environments on the physical activity and support needs of ambulatory children with cerebral palsy with hypotheses that walking activity and independent play would increase on an ADAAG-compliant playground. Successfully securing two internal grant awards from the Center for Teaching Excellence and Learning to travel to national conferences, Sarah and Emily presented their research at the American Physical Therapy Association’s Section on Pediatrics Annual Conference (SoPAC) in Orlando, Florida in September 2012 and at the APTA Combined Sections Meeting in San Diego, CA in January 2013. Their research was published in the Journal of Pediatric Physical Therapy. Sarah and Emily excelled through the DPT program and are both continuing to advance in their chosen careers, applauding the extraordinary faculty within the Physical Therapy and Health Sciences department. Both Sarah and Emily attribute much of their success to the exceptional guidance of the faculty who mentored them throughout their careers at Bradley, most notably Dr. Brenda Pratt, Dr. Dawn Hall, Dr. Joseph Kelly, and Dr. Cheryl Sparks. Sarah is a Physical Therapist and Orthopaedic Resident at OSF Outpatient Physical Therapy at Glen Park. Emily is a Physical Therapist at the Accelerated Rehabilitation Center in Champaign, Illinois.

“Q and A” with Emily and Sarah:

Why did you choose Bradley University for your graduate education?

Sarah: I chose Bradley for my graduate studies because I am from the Peoria area and I wanted to have a more intimate setting with classmates and professors as I came from a very large undergraduate school. Bradley offered an excellent teacher to student ratio and was conveniently located a block from my home.

Emily: I chose Bradley for my graduate education because of the size of the program. I knew that the size of the program would allow/foster mentorship and peer interaction that larger programs would not. I knew that the program must be incredibly strong especially after looking at the phenomenal pass rate for the national licensing examination we take after graduating.
What is your best memory of being a student at Bradley?

Sarah: My fondest memories are the after hour study sessions I had with classmates who became like family because we spent a good 75% of our lives together. We would come up with pneumonics, games, songs and practice exams when we studied together. I feel our program (Doctor of Physical Therapy) is unique in that we all worked together rather than competing against each other to succeed in our written and practical examinations.

Emily: There are too many memories to choose just one. The countless hours my classmates and I spent together to learn and develop relationships, the numerous opportunities Sarah and I had to travel and represent Bradley University, the potluck lunches and breakfasts that the faculty loved us for doing.

Why should students be involved in research with faculty?

Sarah: Being involved in research with faculty creates an entirely new relationship and respect for the knowledge and experience that the faculty members offer. It is also helpful to have the guidance when data collection and analysis becomes challenging.

Emily: Taking part in research is tedious, I know. But working with faculty gives you the opportunity to have guidance in the process. It enables you to better understand/appreciate other research projects and of course the opportunities to travel and interact with peers on a national level are very worthwhile.

Tell us about your research experiences as a student in Physical Therapy and Health Science at Bradley. Did your research involve a team? Were any of your collaborations multidisciplinary?

Sarah: We had 2 students and one faculty member and recruited children/families in the area which provided for a nice collaboration between Bradley and the community. The entire process, from IRB approval to data collection/analysis to final product and presentation, required extensive preparation, brain power, time and energy that gives me an appreciation for the work that is put into the countless research articles that are out there in every field of study.

Emily: Our project was definitely a team effort between Sarah, Dr. Pratt and myself. Countless hours were spent in Dr. Pratt's office going over plan and statistical analysis.

How did working with others, including faculty and students, affect the quality of your research experience at Bradley?

Sarah: I learned the benefits of setting deadlines and being accountable to expectations to decrease stress when getting close to the ‘end product’.

Emily: Working with Dr. Pratt positively impacted the quality of our research as it is a field she is extremely passionate about and has had much experience in which was very motivating for both Sarah and me. It's hard not to get excited about something when your mentor is as motivated and enthusiastic as Dr. Pratt was about this project.
What challenges did you face as a graduate student while conducting research? What did you learn from working through these challenges?

Sarah: Your hypothesis may not always be correct and you have to look for correlations and further avenues to research once you do have results. Research, especially when there is a qualitative aspect, is never black and white which requires ‘embracing the grey’ as our professors always say.

Emily: The biggest challenge was time - because it always seemed like there was never enough. The deadlines forced you to be pro-active and diligent with staying on task. We (Sarah and I) also had to get better at communicating with each other and with Dr. Pratt. While it was a team effort it was our responsibility to be in charge of our project and learning how to be honest and clear in what we said helped tremendously.

What do you see as the benefits of having the opportunity to share your experiences with others at the Student Scholarship Expo?

Sarah: Presenting at the Expo challenged me to be confident with public speaking and required me to adjust my verbiage or dialogue based on who was listening. I really appreciated seeing the research from the other programs as I was thoroughly engrossed in my realm of physical therapy. It is refreshing to see the passions of others as well as opportunities for potential cross-over among professions to collaborate.

Emily: Being able to share my experience with others will hopefully allow people to understand the importance of seeking out answers which is what the ultimate goal is of research. And I hope that students also realize how great of an impact each persons' project can have. Multiple people approached Sarah and I at the national conventions we attended to tell us how glad they were to see our project existed and what they planned to do with our results in regards to making positive changes in their community.

What was the most exciting part about conducting research at Bradley?

Sarah: Emily and I had to opportunity to travel to Orland, FL and San Diego, CA to present at national conferences, (one focused in Pediatrics and one collective for all physical therapy).

How do you think your graduate scholarly activities better prepared you for your chosen career?

Sarah: Bradley University is considered a research based university which demands excellence from every student. Incorporating current research and evidence into my practice requires constant learning and growth in order to provide the best care for every person I see and treat. Bradley has engrained in me the drive to challenge myself and not settle for ‘standard care’.

Emily: In regards to our research activities at the graduate level it has better prepared me for my career by giving me a greater understanding and appreciation for research which is vital in our field. I also became more confident in my public speaking skills which are important for my future plans to be more involved with the Physical Therapy Association at the state and possibly national level.
How did your involvement with student research impact your life?

Sarah: As much as I thought research would be a dreadful and overwhelming task, I have found it a necessity within the physical therapy profession as I continue into my career as a new clinician. I am currently doing an orthopaedic residency and have had the opportunity to participate in another research project regarding physical therapy interventions for acute neck pain that utilizes functional MRI. This research is in conjunction with OSF Medical center and I am under the guidance of leading researchers including two Bradley professors (Joe Kelly, PT and Dr. Cheryl Sparks).

Emily: Student research allowed me multiple opportunities to travel to present on a national level. Not only was it exciting just to take the journeys but there were multiple opportunities to interact with my peers and future peers regarding our research and the impact it could have. I now have multiple contacts throughout the nation that I did not have before that spawned from our opportunities to travel.

Congratulations Sarah and Emily on your accomplishments!!

Bradley University is proud to be a part of your journey!!
Christopher Costello presents his research, “Design of a Novel System for Omnidirectional Motion” at the 2014 Student Expo (project abstract on page 23)
Organizational Detachment: The Role and Responsibility of Management is the first collaborative research project I have done as a graduate student in the Master of Business Administration program at Bradley University. With the expertise of Drs. Buchko, I have taken a multi-disciplinary approach to research that promotes diversity of thought in solving complex management issues.

-Cara Sledgister
Display: 1
Project Title: Determining the likelihood of stock price movements using the dividend yield to current yield spread
Student Presenter: Tyler Beason
Faculty Mentor: Dr. Amit Sinha
Department: Finance, Mathematics
Undergraduate Project

Abstract: I will attempt to identify a relationship with the spread between dividend yield and current yield for a company and its stock movements. Using annual data on stocks and bonds from both domestic companies and international companies who trade domestically by way of American Depository Receipts (ADR), I will use regression testing to determine if a relationship exists. An examination of previously published literature is included to help motivate the research. The results of this first-pass empirical testing will drive further empirical and theoretical research to follow, and a brief description of possible future research is given.

Display: 2
Project Title: Cultural Analysis of 30 person Human Resources Team
Student Presenter: Matthew Carlberg
Faculty Mentor: Dr. Elena Gabor
Department: Psychology, Sociology
Undergraduate Project

Abstract: I set out to examine the culture of a large Human Resources team (approximately 30 people) to determine strengths and weaknesses of their culture and provide potential action items based on my findings. I used the quantitative methods of 1-on-1 interviewing and field observations. I found a primarily healthy culture with a few weaknesses, which I addressed thoroughly in my output.

Display: 3
Project Title: Best Fit Model For Yield Curve Estimation On Spain Financial Market
Student Presenter: Anna Galstyan
Faculty Mentor: Dr. Amit Sinha
Department: Quantitative Finance
Graduate Project

Abstract: Yield curve has a tremendous impact on financial market from different perspectives. Yield curve will help to develop domestic capital market and correctly price financial instruments. Yield curve represents a relationship between the rate of return and the maturity of certain securities. Its shape reflects the shape of the economy, which, in turn, can predict recession. These are the reasons why it is important to properly and accurately estimate the yield curve. There are various models evolved for its estimation. However, the most used ones are parametric models: Nelson-Siegel model and Svensson model. In this work the yield curves are estimated on Spain financial market, based on monthly data from 2004 till 2014 both with Nelson-Siegel and Svensson model. Then obtained results are compared and Nelson-Siegel model on average perform better than Nelson-Siegel and Svensson model for Spain economy.
Display: 4
Project Title: *Global Financial Market Conditions and Emerging Market Economies*
Student Presenter: Fadil Ramadani
Faculty Mentors: Dr. Ahmed Elshahat, Dr. Amit Sinha, Dr. Philip Horvath
Department: Finance
Graduate Project

Abstract: This paper utilizes Bayesian vector autoregressive (VAR) models to determine the effects of global financial market conditions on emerging market economies. Specifically, financial market variables such as global interest rates, foreign exchange rates, and financial risk, measured using country spreads, are examined. Since most emerging market economies rely heavily upon exports, changes to these financial variables are key contributors to macroeconomic fluctuations for emerging markets. With global interest rates on the rise, the effects of financial market conditions on emerging markets have accumulated a significant amount of interest from researchers.

Display: 5
Project Title: *Organizational Detachment: The Role and Responsibility of Management*
Student Presenter: Cara Sledgister
Faculty Mentors: Dr. Aaron Buchko, Dr. Kathleen Buchko
Department: Business Management and Administration, Leadership in Education, Human Services, and Counseling
Graduate Project

Abstract: The transition into retirement has been examined and researched from many different perspectives. Detachment from a place and role that one has held for many years results in a transitional time that is as varied in impact and scope as the number who are retiring. Research in the area of retirement has yielded many organizations, seminars, workshops, and consultants to help the new retiree adjust to life after work. In this paper, we suggest that one of the best resources for retirees to utilize in this transition could be the organization for who they were employed. We propose that organizations are in a unique position to assist their former employees in transition to retirement, thereby fulfilling an ethical responsibility as well as generating benefits for the organization.

Display: 6
Project Title: *Examination of Investors’ Fear: Is Gold Market Rational?*
Student Presenter: Domician Zahorjan
Faculty Mentor: Dr. Amit Sinha
Department: Finance
Graduate Project

Abstract: This paper examines the question of how the gold futures price reflects the uncertainty of investors. The main purpose of the research is to explain the relationship between gold futures prices and traditional economic variables. Futures prices are important source of market information and investors’ sentiment. Gold was historically considered as a “safe-haven” investment that would store the value in the
times of crises. Therefore, the price of gold should theoretically reflect not only fundamental determinants (such as GDP or interest rates), but also the mood of investors facing various uncertain situations (such as political instability or expected inflation). Understanding of how these variables influence the futures price of gold is crucial part of investment analysis. This paper is using the “cost of carry” model to explain the behavior of gold futures prices. We address the question of how the gold futures prices are determined and which variables can explain the changes in futures prices. The regression model is developed to explain the cost of carry in period of 2001-2014 using traditional economic variables. Furthermore, the possibility of other additional explanatory variables is examined in order to improve the explanatory power of model.

(Above) Sydney Schneider presents her project, “Critical Reflection in Relation to Design Research” at the 2014 Student Expo (project abstract on page 50)
“My research efforts at Bradley have greatly affected both my professional and academic abilities. The research process has taught me about how studies are done in both industry and in academia. Plus, it has provided me with a much greater understanding of the topics currently being taught in my classes.”

-Nicholas Pratt

“The way I view classes now has changed already in the research I have done. It went from wondering “when am I going to use this” to “I need to learn more so I can contribute even more”. This has helped motivate me inside and outside of class to do well in all aspects of my education.”

-Joseph Groe
**Project Title:** Software Engineering of Gamified System for Assessment of Workforce Skills and Performance  
**Student Presenter:** Sadiya Ahmad  
**Faculty Mentor:** Dr. Vladimir Uskov  
**Department:** Computer Science and Information Systems

**Graduate Project**

**Abstract:** Applications of serious games (SG) in industry and gamified applications for various business processes is growing at a fast pace in industry, corporations, businesses, and companies. The well-known applications of SG and gamified applications, particularly, are relevant to recruitment process of employees in industry. Rather than confining SG and gamified applications to just one sector, their implementation to a wider range on processes and activities in industry can fetch much more appealing results and outcomes.

The proposed concept is based on implementation of SG strategies, techniques and methods in capturing strategies, behavior and personalities of employees – this will enable businesses to establish better teams and create business environment for improved workforce performance. Personality testing-focused SG are becoming a new high tech tool in recruiting. However, the concept has not yet been applied for team building through compatibility. The proposed approach is not focused on a simulation or learning process for employees – it is aimed at analysis processes. The main outcome of this research project is the synergy of three main fields of study – psychology, economics and computer science.

Evaluating personalities through serious game playing without a questioner is the initial step to an advanced maneuver. There are many psychological practical approaches to the intended design. The analysis will be carried out on the basis of Big Five Personality traits (OCEAN). In this case, team building is achieved by implementing Group Polarization Effect. Behavioral finance and economics can also help to formulate situations for teams to invest in and then evaluate their nature of investment.

Based on the performed up-to-date research the proposed approach seems to be instrumental for a design and development of advanced gamified software system for assessment of workforce skills and performance.

**Project Title:** Effect of surface roughening on adhesion in polysilicon microdevices enhanced by electrochemical corrosion with varied cathode/anode surface area ratio  
**Student Presenters:** Erik Anderson, Alyssa Macuk  
**Faculty Mentor:** Dr. Shannon Timpe  
**Department:** Physics, Mechanical Engineering  
**Undergraduate Project**

**Abstract:** With the growth of micro- to nanotechnology in recent decades, inertial properties in these small scale devices are of reduced importance when compared to the more dominant surface interactions. The presence of both gold and polycrystalline silicon in a given microelectromechanical systems (MEMS) device through electrochemical corrosion can lead to profoundly impact these interfacial properties. Tests show increased surface roughness with increased gold (cathode) to silicon (anode) ratio of an enhanced galvanic effect. Furthermore, microdevices with larger surface area ratios were found to have lower adhesion between contact components. The increased surface roughness is expected to reduce the real contact area and the
average surface separation, thereby decreasing the force of adhesion. Results are interpreted in light of the principle galvanic corrosion mechanisms and the effect on the primary nanoscale intermolecular forces.

Display: 9
Project Title: Mathematical Modeling, Analysis and Comparison of Ciphers and Modes of Operation
Student Presenter: Hayk Avagyan
Faculty Mentor: Dr. Alexander Uskov
Department: Computer Science and Information Systems
Graduate Project

Abstract: Security of information and data transfer over the Internet is still one of the major problems in computer information systems (CIS) area. To satisfy security requirements, the CIS should provide confidentiality, integrity and authenticity. The quality and performance of security system significantly depends on chosen encryption algorithm (cipher) and mode of operation.

These days a great variety of cryptosystems is available for CIS developers – systems with different ciphers, modes of their operation, levels of security and operation performance. We are defining a cryptosystem as a five-tuple \( S=(P,C,K,E,D) \) which contain sets of plaintexts (P), ciphertexts (C), keys (K) and mappings of encryption (E) and decryption (D). Most of ciphers are using permutation and substitution mapping to encrypt plaintext. Modern ciphers combine several mappings in one so-called round function and iterate this function several times. Some modes of operation, such as ECB, CBC, CTR etc., do not provide integrity and authenticity of encrypted data and some use too much resources. Because of the variety of different algorithms, there is always a dilemma – what cipher and mode of operation to select in order to satisfy given security needs (data confidentiality, integrity and authenticity) and cipher performance.

This research multi-aspect project is focused on mathematical modeling and analysis of ciphers and modes of operations. The main goals are: 1) provide uniform and adequate mathematical representation of ciphers’ and modes’ algorithms; 2) based on introduced math notation, identify quantitative algorithms to estimate security of ciphers; and 3) compare different ciphers in different modes from security and performance perspectives.

Display: 56
Project Title: Network connectivity analysis in wireless sensor networks
Student Presenter: Hayk Avagyan
Faculty Mentor: Dr. Yun Wang
Department: Computer Science
Graduate Project

Abstract: Network connectivity, as an important measure of communication robustness in wireless sensor networks (WSNs), has been explored extensively in the literature for efficient end-to-end sensing data collection and data fusion for many WSN applications such as intrusion detection. However, existing research and results focus primarily on the full connectivity analysis assuming a uniform distribution of sensors in a bounded application field of interest. In practice, different applications can have very different requirements on the network connectivity and not every application requires full connectivity to operate successfully. Besides, the sensor distribution can be non-uniform due to geographical limitations and deployment
deviations. Thus, we investigate the network connectivity problem by taking into consideration non-uniform sensor distributions and various application-specific requirements through modeling and analysis. The results can help in identifying critical network parameters for real-life WSN applications.

Display: 11  
**Project Title:** GPGPU Technology for High-Performance Computing and Data Security: Research, Modeling, Applications  
**Student Presenters:** Hayk Avagyan, Adam Byerly, Vinay Bhargav, Dilan Britt  
**Faculty Mentor:** Dr. Alexander Uskov  
**Department:** Computer Science and Information Systems  
**Graduate Project**  
**Abstract:** GPGPU technology-accelerated computing is the innovative use of a graphics processing unit (GPU) together with a CPU to accelerate scientific, engineering, and enterprise applications. Pioneered in 2007 by NVIDIA, GPGPU technology now powers energy-efficient datacenters in government labs, high-computing research labs, and small-and-medium enterprises and businesses around the world.

The on-going multi-aspect research, design and development project at CS&IS Department (Bradley University) is aimed at GPGPU applications for information/data encryption algorithms (ciphers) and modes of their operations (modes). The premise is that theoretically GPGPU technology can increase performance of ciphers and modes by 10…50…100…1000 times (!) depending on number of available CPUs and/or GPUs. In this project we used a) Advanced Encryption System 256-bit (AES-256) cipher in Cipher-Block-Chaining (CBC) mode for parallelization, b) various CPUs both in single and multi-core modes of CPU operation, and c) a set of GPUs. Particularly, the developed software and cipher performance have been thoroughly tested on advanced CPUs such as Intel i7-3630QM 2.4 GHz and Intel i7-2630QM 2.0 GHz, and state-of-the-art GPUs such as 2GB NVIDIA GeForce GT 750M, and 1GB NVIDIA GeForce GTX 460M.

The obtained research data and outcomes clearly demonstrated the potential significant power of GPU technology for general purpose computing; particularly, we obtained corresponding data and concluded that the use of multithreading can increase advanced cipher’s performance up to 100+ times. On the other hand, the cipher’s performance significantly depends on a type of GPU used, and, in some cases (for example, i7-3630QM vs GT-750M) CPU can be faster with less number of threads.

The multiple up-to-date research project’s findings and outcomes will be helpful for researchers and experts in Computing to identify optimal GPGPU technology applications focused on optimal software/hardware solutions for various computing and information/data security processes and tasks.
Display: 12
Project Title: Bioimmetic Quadruped Robot for Climbing Trees
Student Presenter: Alexandra Burke
Faculty Mentor: Dr. Joseph Driscoll
Department: Mechanical Engineering
Undergraduate Project

Abstract: Animals have evolved to meet a wide variety of mobility challenges in a range of environments. By mimicking the structure and behaviors of animals, we can exploit these natural designs for our own applications in similar settings. Robots with animal-like designs, such as the “Cheetah” developed by Boston Dynamics, are gaining in popularity as advances in technology make it possible to mimic complex animal structures in a lightweight, power-efficient robot. In this project an autonomous tree-climbing robot will be designed, built, and evaluated. The robot developed for this project will eventually be able to climb trees, move along uneven ground, and interact with humans. The nature of this interaction can be in the form of human-seeking or human-avoiding behaviors, facilitated by appropriate sensors, controllers, and actuators. Applications for such a robot include reconnaissance, recreational toys, search and rescue robots, and household uses such as gutter cleaning. Beyond the obvious challenge of climbing trees, other challenges include maximizing battery life, choosing lightweight components, and providing autonomy to the robot’s behavior. Here we report on our progress so far, which includes the design, construction, and testing of the prototype walking robot platform. Future work will extend these results to tree climbing behavior.

Display: 13
Project Title: Textpresso: a full text search engine for ciliate literature
Student Presenter: Guanqun Cao
Faculty Mentor: Dr. Nicholas Stover
Department: Computer Science and Information Systems
Graduate Project

Abstract: Textpresso is a software package available from the Generic Model Organism Database project (GMOD) that allows full-text searching of scholarly articles. We have implemented this new tool at Ciliate.org, a suite of model organism database websites for ciliated protists that has been hosted by the Bradley University Department of Biology and Department of Computer Science & Information Systems since 2010. Textpresso extracts text from papers published in PDF and HTML formats, categorizes each word and sentence from the article according to section headings, and stores this information in an online searchable database. Users can search the papers in the database for simple keywords, or they can choose advanced options that allow queries using Gene Ontology terms and other categories. Sentences containing the search terms are displayed to the user, showing the complete context in which the terms are used. Textpresso is a valuable aid that reduces the time and money spent by researchers hunting for information, by helping them identify papers most relevant to their investigations. To date we have loaded full-text articles for more than 1700 articles published on Tetrahymena thermophila, and intend to expand to the other ciliate communities we serve. See our implementation of Textpresso at http://ciliate.org/textpresso.
Project Title: Quantifying Intrinsic Properties of Resting Lumbar Muscle in Healthy Subjects Using a Handheld Myometer
Student Presenters: Brandon Coates, Alexander Barry
Faculty Mentor: Dr. Kalyani Nair
Department: Mechanical Engineering

Abstract: Resting muscle exhibits certain inherent properties whose interpretation is important to the understanding of the function and health of muscle. These physical properties aid in better understanding the behavior of muscle and its effects on the lumbosacral spine. A wealth of research has been performed on actively contracting muscles, however there is little existing literature on the properties of muscle in its relaxed state. In this study, the resting muscle properties of the lower lumbar muscles were quantified in 20 young, healthy adults. Measurements were taken from the left and right sides of the back, and were repeated after a 10 minute waiting period. Surface electromyography (sEMG) measurements were also carried out simultaneous to ensure the patient’s muscles were in a resting state. Data suggest that the hypothesis of a population variation of human resting muscle tone (HRMT) properties may occur among normal subjects; however, more quantitative data is required to confirm and characterize this trait.

Project Title: Design of a Robust Position Sensing System
Student Presenters: Christopher Costello, Andrew Aubry, Kenneth Ratekin, Leann Vernon, Phillip Latka, Kinzie Sellers, Scott Roth, Rose Wurster
Faculty Mentors: Dr. Martin Morris, Dr. Jose Sanchez, Dr. Kenneth Klotz
Department: Mechanical Engineering

Abstract: Caterpillar approached Bradley University seeking a cost effective, robust, and reliable solution to replace their current linkage sensors on D8 tractors, which are failing at an unacceptably high rate. These sensors determine the position of the D8 tractor’s end implement. The end implement position provides operators with automated controls and increases the efficiency of the D8. A team, consisting of Business, Electrical Engineering, and Mechanical Engineering students, was constructed to meet Caterpillar’s request. The team needed to develop a new design that maintains the accuracy and robustness of Caterpillar’s current system while decreasing cost and repair downtime. After preliminary research and brainstorming, there were two designs that best fit Caterpillar’s requirements: a laser distance sensing system (LDS) and a wheel and encoder system. The LDS uses a rotating laser to determine direct blade location via tracking algorithms. The second system uses three wheel and encoder systems to determine the location of the lift cylinder that controls the blade, which is related to the end implement position. Methods of data collection and algorithms for analysis for both systems were implemented using Texas Instrument’s Tiva-C microcontroller. Preliminary housing designs for the wheel and encoder system were produced and prototyped. In order to quantify profitability of the new designs, the team performed a comprehensive return on investment analysis, a net present value analysis, and an internal rate of return sensitivity analysis. In addition, the team created a marketing plan geared toward Caterpillar.
Display: 16
Project Title: Design of a Novel System for Omnidirectional Motion
Student Presenters: Christopher Costello, Christopher Golden, Elliot Clarke
Faculty Mentors: Dr. Julie Reyer, Dr. Joseph Driscoll
Department: Mechanical Engineering
Undergraduate Project

Abstract: The purpose of this project was to determine a novel drive train to produce omnidirectional motion. Omnidirectional motion is defined as the ability to move in any direction given any orientation. Instead of using traditional cylindrical drive wheels the system uses half spheres. The drive wheels are attached to a device that allows the wheel to be rotated into different angles to produce the omnidirectional motion. What separates this omnidirectional system from a traditional one, is a built in extra degree of freedom allowing for quicker directional changes, spinning and driving, and the possibility for auto leveling. Applications of this technology could include personal transportation (wheel chairs, cars, segway type vehicle), room mapping, R/C robotics, fork lifts, and automated warehouse robots.

Display: 17
Project Title: Data Visualization and Education Utilities for Smithsonian Forest Plots
Student Presenters: Josh Dober, Brendan Kelly, Andrew Peterson, Justin Sassine, Anthony Stephan
Faculty Mentor: Dr. Steve Dolins
Department: Computer Science and Information Systems
Undergraduate Project

Abstract: Smithsonian Tropical Research Institute (STRI) scientists have large amounts of forest plot data; however they lack the means to efficiently share this information with other scientists and to the public. With this problem in mind, we developed two tools to help their information more accessible. First, we have expanded their webserver to automatically generate webpages that describe a specific species, including data extracted and computed from their database. Additionally, their website will have a webpage dedicated to describing a species which is randomly chosen each day. The second tool we developed automatically generates population ecology books which describe all the species in a certain plot. Both tools provide an easy way for STRI to upload photos and add descriptions in multiple languages. By providing these two tools, STRI will be able to share their data and make it accessible to scientists and the public.

Display: 18
Project Title: Design of a Compact, Efficient, and Robust Pneumatic Powered Ankle Orthotic
Student Presenters: Rebecca Epping, Alexander Barry, Andrew Davis, Samuel Kelly
Faculty Mentor: Dr. Martin Morris
Department: Mechanical Engineering
Undergraduate Project

Abstract: The purpose of this project is to design and build a pneumatic powered ankle orthotic to assist patients who have suffered an injury or have some sort of degenerative muscle condition that has left them without full function of their ankle and foot. The creation of this device will not only improve the safety of
their everyday life, but also speed the rehabilitation process. To ensure that the patients with these conditions are able to walk with ease, the orthotic needs to be designed and constructed to both support the ankle, and provide assistive movement. It is important that the orthotic replicates normal ankle movement of a healthy individual. This project is completed in conjunction with a team at University of Illinois Champaign-Urbana, the U of I team was focused on constructing the shell for the orthotic. The Bradley team focused on the construction of the pneumatic actuator, ensuring that the design was compact, efficient, and robust while providing at least 30 Nm of torque and 55° range of motion. The system is powered by a CO2 canister and uses a system of gears to convert the linear motion from the pneumatic cylinders to replicate the natural rotational motion of the ankle.

Display: 19

Project Title: Autonomous Quadcopter with Human Tracking and Gesture Recognition
Student Presenters: Daniel Garber, Jacob Hindle, Bradley Lan
Faculty Mentor: Dr. Joseph Driscoll
Department: Electrical and Computer Engineering

Undergraduate Project

Abstract: A “quadcopter” (also “quadrocopter”, etc.) is a type of aircraft similar to a helicopter. The quadcopter has four powered propellers from which lift is provided. By varying the speed of each propeller, the aircraft can be made to alter its orientation and direction of motion. Unlike conventional helicopters, the propeller blades do not have to have varying orientation, thus simplifying the design. The goal of this project is to create a quadcopter that can autonomously track and follow a particular human as well as respond to gesture-based commands. We start with a commercially-available radio-controlled quadcopter, and then add sensors, microcontrollers, and other electronics. Autonomous flight will include auto-stabilization, obstacle avoidance, low battery warning, and other necessities for safe flight. As an added safety measure, there will be a radio control-based manual override. The human tracking will rely on sensor data such as video images and GPS data. Here we present our early results in this ongoing project.

Display: 20

Project Title: Effect of Interfacial Voltage on the Evolution of Surface Adhesion at Microdevice Contacts under Static and Repetitive Impact Loading Conditions
Student Presenter: Kevin Glick
Faculty Mentor: Dr. Shannon Timpe
Department: Mechanical Engineering

Undergraduate Project

Abstract: Microelectromechanical systems (MEMS) are used in advanced sensing and actuation applications such as accelerometers, microswitches, and biosensors. Many such applications include electromechanical contacts in which a voltage is applied across an interface. The effect of current flow on the evolution of interfacial adhesion at nano-asperity contacts was examined under both dynamic and static switching conditions. The dynamic tests studied the effects of repetitive impact loading with applied interfacial voltage levels ranging from 0 to 6 V and impact velocities of approximately 200 µm/s. Independent of voltage, each test showed a relatively stable run-in period with negligible change in adhesion. After the run-in, each test
exhibited a degradation period with logarithmically increasing interfacial adhesion. This is attributed to damage to the contact interface including decreases in roughness, removal of oxide layers, and charge trapping. Due to enhanced electrical and thermal damage, higher interfacial voltage resulted in more rapid degradation. Static contact tests were also performed in order to decouple the effects of mechanical damage, caused by impact loading, and electrical and thermal damage, caused by current flow. It was noted that the current flow effects resulted in greater damage in the static tests, indicating interactions between the electrical and mechanical damage modes.

**Display: 21**
*Project Title:* Innovative Agile Software Engineering  
*Student Presenter:* Harika Govada, Nikhitha Peesari  
*Faculty Mentor:* Dr. Vladimir Uskov  
*Department:* Computer Science and Information Systems  
*Graduate Project*

**Abstract:** The use of agile methodology components - agile methods, techniques, framework, tools, and applications - has more than tripled in the most recent several years because multiple large-size, middle-size and mostly small-size enterprises move from traditional heavily regulated business processes-driven approaches towards customer-focused and business value-driven flexible approaches.

The performed analysis of the current status of agile methodology applications in industry clearly shows that it will soon need a significant number of well educated and highly skilled specialists in this area – agile software development project managers, agile software engineers, analysts, developers, testers, etc. The findings and outcomes of performed analysis motivated the authors – faculty and graduate student at Bradley University (Peoria, IL, U.S.A.) - to work collaboratively, propose and design innovative academic curriculum in Agile Software Engineering.

This paper presents the main findings and outcomes of analysis, design and development phases of innovative Agile Software Engineering (ASE) curriculum and courseware creation.

**Display: 22**
*Project Title:* Component Re-design for an Increased Capacity in the Renaissance Coliseum  
*Student Presenters:* Ross Hinrichsen, Aaron Birk, Colten Brunenn, Brendan Mark, Tom Meismer, Tia Clark, Adam Houin  
*Faculty Mentors:* Dr. Martin Morris, Dr. Jacqueline Henderson, Dr. Kenneth Klotz  
*Department:* Mechanical Engineering  
*Undergraduate Project*

**Abstract:** The Renaissance Coliseum currently hosts events such as women's basketball, volleyball, job fairs, and December commencement. It does not have a large enough capacity to host bigger events that could be profitable for Bradley University. Hosting larger events at the Renaissance Coliseum could be used to generate profit. The main objective of this project is to increase the capacity of the Renaissance Coliseum in order bring in a variety of larger events to increase the Renaissance Coliseum’s potential annual revenue. Both the architectural and load bearing aspects of the Renaissance Coliseum has been evaluated to determine how
much the capacity can be increased and what possible solutions could accomplish this change in capacity. In order to maximize the increase in capacity, a culmination of multiple improvements will be implemented. These designs include replacing some of the existing seats with bleachers, the addition of more rows of seats, and the addition of an upper tier. All designs have been evaluated to ensure compliance with building codes, ADA requirements, and fire codes. With these additions, it has been estimated that the Renaissance Coliseum has a potential to increase from 3,900 to above 5,500 seats. All designs will be submitted to Bradley University Athletics for consideration in future renovations.

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**Project Title:** Autonomous Fixed-wing Crop Survey Drone  
**Student Presenters:** Danielle Johnson, Benjamin Gorgan  
**Faculty Mentor:** Dr. Joseph Driscoll  
**Department:** Electrical and Computer Engineering  
**Undergraduate Project**

**Abstract:** This project will develop an unmanned aerial system, commonly referred to as a “drone”. The drone will start as a commercially-available radio-controlled airplane. The addition of microcontrollers, cameras, and other sensors will allow the aircraft to operate autonomously. The purpose of the drone is to perform aerial imaging surveys of user-specified regions, such as crop fields. Such systems are commercially available, but are expensive and lack some features our drone will provide. The market for unmanned aerial systems is projected to grow by $82 billion from 2015 to 2025, and create over 100,000 new jobs. The majority of this growth is expected to come from “precision farming.” This approach to agriculture uses large amounts of data to determine the health and quality of crops. Such data can include soil moisture from sensors spread throughout a field, and various types of aerial imaging. The goal is to use this data to determine where resources such as fertilizer and water are needed most, therefore avoiding waste and improving crop yield. This project will develop a drone to provide imagery for use in precision farming applications. By producing a high-resolution image of a crop field using specific optical filters, health of the crops can be determined. An important feature of our drone is its autonomous nature. The operator first defines the boundaries of the survey area via GPS coordinates. Next, the drone is hand-launched somewhere near the field. The drone determines its location (via GPS) and calculates a navigational route allowing it to image the entire area. The drone lands in the location from which it was launched, or some other user-specified location. The images are assembled into a single large image which is then emailed to the user, along with a notification that the drone is ready for retrieval. Here we report on our preliminary results for this ongoing project.
Display: 24  
**Project Title:** Micro- and Nanoscale Characterization of Surface Contact Adhesion in Polycrystalline Silicon Exposed to Process-induced Electrochemical Corrosion  
**Student Presenter:** Alyssa Macuk  
**Faculty Mentor:** Dr. Shannon Timpe  
**Department:** Mechanical Engineering  
**Graduate Project**

**Abstract:** As micro- and nanodevices are scaled down, surface forces can be on the same order of magnitude as external or inertial forces, significantly affecting device reliability. In this investigation, the surface morphology of polycrystalline silicon was altered on both the micro- and nanoscales using electrochemical corrosion. To characterize the morphological alterations on the two scales, scanning mode atomic force microscopy measurements were taken at discrete scan sizes. Results revealed that increased exposure to electrochemical corrosion increases surface roughness on the microscale, but decreases roughness on the nanoscale. In order to investigate the effects on the surface mechanical properties, adhesion measurements were made on the microscale using a custom designed microdevice and on the nanoscale using contact mode atomic force microscopy. The force of adhesion was found to decrease on the microscale, but increase on the nanoscale as a function of corrosion time. Experiments are interpreted with respect to the mechanism of electrochemical corrosion and the principle adhesive intermolecular forces. Opposing experimental trends on the two scales are attributed to the fundamental geometric differences between micro- and nanoscale topography for polycrystalline materials. This work was funded by the Illinois Space Grant Consortium, the Bradley University Heuser Research Award, and the Bradley University Center for Teaching Excellence and Learning.

Display: 25  
**Project Title:** Club Carbaret: A Game To Educate Diabetic Patients About Carbohydrates  
**Student Presenters:** Grant Mooney, Grant Mooney, Xavier Gordon, Anson Goode, Connor Eck, Tony Opp  
**Faculty Mentor:** Dr. Monica McGill  
**Department:** Computer Science and Information Systems  
**Undergraduate Project**

**Abstract:** Club Carbaret is a mini-game for Dapper, a Serious Game developed by previous students of the Game Design Capstone class with the aim of increasing participatory healthcare and awareness of Type II Diabetes. Carbohydrates are the parts of food that give your body energy. When your body processes foods with carbohydrates, your body makes glucose. Too many carbohydrates will make the body produce too much glucose, which is harmful for diabetic patients. Therefore, patients with diabetes must count their carbohydrate intake. The primary goal of Club Carbaret is to teach players what foods are high in carbohydrates through a simple, entertaining counting game. Players are given a small time window in which they count the number of highlighted foods that fly across the screen and are rewarded for each time they guess the number correctly. By so doing, patients will learn which foods are high in carbohydrates. Club Carbaret has been developed over the Spring 2014. It is currently under efficacy testing and will be released with Dapper later this year.
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Project Title: Design a system for efficient environmental control of Bradley Hall
Student Presenters: Shiv Patel, Grant Bowald, Nick Dueprez, Ryan Miller, Sara Lewis, Tyler Beason, Christian Moore
Faculty Mentors: Dr. Marty Morris, Dr. Kenneth Klotz
Department: Mechanical Engineering

Undergraduate Project

Abstract: The goal of this project is to design a system for efficient environmental control which will aid in the correction of many environmental issues which are occurring in Bradley Hall. These environmental issues affect occupants comfort and create other issues. Data will be recorded throughout the year resulting in analysis which can be applied to a variety of models. Creating a specific environment which people feel comfortable with is strongly influenced by one’s senses. Our mission for this year is to provide ENTEC with a design and solution for Bradley Hall which focuses on people’s comfort while designing a system to optimize. This design includes, but is not limited to, heating, cooling, ventilation, lighting, and controls to name a few.

Display: 28

Project Title: A Low-Cost Computer Cluster for High-Performance Computing Education
Student Presenter: Aaron Pfalzgraf
Faculty Mentor: Dr. Joseph Driscoll
Department: Electrical and Computer Engineering

Undergraduate Project

Abstract: Skills in high-performance computing (HPC) are increasingly desired by many employers. However, traditional curricula sometimes do not provide adequate preparation. This is often due to the high cost of HPC equipment needed to provide students with needed hand-on experience. In this paper we describe a HPC system that is small, low cost, and yet powerful enough to support educational activities in HPC. We use the Raspberry Pi, which is a recently-developed, extremely popular, single-board computer. It has seen mass adoption by students and programming veterans alike. This device has great potential for building a computing cluster due to its extremely low footprint, cost, ease of use, and transferability of skills to other systems. To explore this, we began a project that revolved around constructing a modular system that could be used for parallel programming education. By using the same software that larger systems use, our system provides a training environment for students to develop transferable, marketable skills.
Display: 29

Project Title: Autonomous Vehicle Speaker Verification System
Student Presenters: Aaron Pfalzgraf, Christopher Sullivan
Faculty Mentor: Dr. Jose Sanchez
Department: Electrical and Computer Engineering
Undergraduate Project

Abstract: With the increasing interest in vehicle automation, security methods have become a primary concern. One possible security measure is a speaker verification system (SVS), which can identify certain features of a pre-selected user’s voice. The goal of this project is the implementation of a SVS on a Texas Instruments c5505 eZdsp development board. The SVS will have a true speaker rejection rate less than 1% and an imposter acceptance rate less than 2%. The SVS would, ideally, be integrated into a simple voice command system for an autonomous vehicle that can understand “stop” and “go” commands. The SVS must operate without discernible delay to the user and be unaffected by mild background noise. The system accepts speech data through an omnidirectional microphone with an operating range of 20 feet. The speech data is divided into frames with a Hamming window and condensed into feature vectors of Mel-warped cepstral coefficients. A set of four artificial neural networks (ANN) are used to accomplish both the speech recognition and speaker verification tasks. These ANNs are trained externally with feature vectors of pre-recorded training speech using the back-propagation algorithm. The training speech consists of a population (n=11) stating “stop”, “go”, and other words. ANN training is performed in MATLAB and the resulting weight vectors are exported for real-time implementation of the ANN on the eZdsp. With our current population size, preliminary simulations have yielded systems with true speaker rejection and imposter acceptance rates each around 7%.

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Project Title: Gait Analysis for a Hexapod Robot with 4DOF Legs
Student Presenters: Nicholas Pratt, Joseph Groe
Faculty Mentor: Dr. Joseph Driscoll
Department: Electrical and Computer Engineering
Undergraduate Project

Abstract: In this project we study the development of walking patterns in a six-legged autonomous mobile robot. Rather than following a preprogrammed pattern of movements, the goal in this work is to allow the robot to develop walking patterns on its own through learning. These patterns should be both efficient in power usage and adaptive to changes such as leg damage and unplanned obstacles in the environment. The ability to learn such complex behaviors has frequently proven to be much more effective in robotics than attempts to preprogram static patterns of motion, especially when the environment has unpredictable terrain and the robot may suffer damage or malfunctions. A commercially available robot base (only frame and motors) was purchased and expanded to include a range of sensors and microcontrollers to allow autonomous operation. The robot is very unique in that each leg has four joints, allowing a much richer range of positions and motions. Such complex legs are virtually unexplored in robotics, but offer great potential for better obstacle navigation. A neural network-based control system will be developed that is able to provide reliable walking patterns for different speeds while maximizing power efficiency. In addition, these neural networks will be trained to be adaptive in the face of obstacles and hardware failures. Here we report on early
results with this platform, comparing the performance between the 4DOF and more common 3DOF hexapod platforms.

Display: 31  
**Project Title:** Wireless Power Transfer System (WPTS)  
**Student Presenters:** Sergio Sanchez, Elie Baliss, Tyler Hoge  
**Faculty Mentor:** Dr. Prasad Shastry  
**Department:** Electrical and Computer Engineering  
**Undergraduate Project**

**Abstract:** Wireless charging—that is charging devices without wires! Sony, Samsung, Qualcomm, and other leading communications companies are currently developing wireless charging systems for mobile devices. The current wireless charging systems are restricted to a charging distance of less than three feet. Thus, there is a need for wireless charging systems that can charge devices at distances greater than three feet. This is a project for converting Radio Frequency (RF) energy to Direct Current (DC) energy over a distance of about nine feet. There are two approaches taken in this project. In the first approach (system 1) RF energy is transmitted at 915 MHz and off-the-shelf commercial components are used to convert RF energy to DC energy. In the second approach (system 2) a Rectenna (antenna + RF-to-DC convertor) designed in this project is used to convert RF energy at 5.8 GHz to DC energy. The performance of the two systems will be compared. The development of the Rectenna involves computer-aided analysis and design, fabrication, and tests and measurements. The performances of the two wireless charging systems will be presented.

Display: 32  
**Project Title:** Evaluation of GPU Processing for Computational Nanoscience  
**Student Presenters:** Nicholas Sikkema, Benjamin Roos  
**Faculty Mentor:** Dr. Joseph Driscoll  
**Department:** Electrical and Computer Engineering  
**Undergraduate Project**

**Abstract:** The use of graphical processing units (GPUs) in general purpose high performance computing has recently escalated. Programmers, engineers, scientists, and many other professions have been using GPU computations that can offer significant code speedups to code that can be parallelized to the thousands of cores that a powerful GPU contains. Density Functional Theory code written in Fortran was profiled, and parallelizable subroutines were identified. While most legacy code is still in Fortran, having a way to implement the code with GPUs may be beneficial. Having that in mind we implemented a way to use Cuda/Fortran using open source compilers rather than commercial alternatives. Timing results varied when such subroutines ran through CUDA on a GPU as opposed to through Fortran. These results reveal when and where GPUs will help speed up high performance code.
**Display: 33**

**Project Title:** Ultrasonic Signal Processing Platform for Nondestructive Evaluation  
**Student Presenter:** Raymond Smith  
**Faculty Mentors:** Dr. Yufeng Lu, Dr. In Soo Ahn  
**Department:** Electrical and Computer Engineering  
**Undergraduate Project**

**Abstract:** Ultrasonic nondestructive evaluation (NDE) has been widely used in quality assessment and failure analysis for critical structures or components in manufacturing, bridge structure, microelectronic packaging, and composite materials for aircraft structure. The NDE system is commonly designed on microcontrollers and digital signal processor, which falls short of meeting the demands of high speed and requirements of adaptability. This necessitates reconfigurable computing devices to implement the system. A Field Programmable Gate Array (FPGA) is a semiconductor device which contains configurable logic blocks, programmable interconnects, and flexible input/output blocks. It is widely used in automotive, communications, industrial automation, motor control, video processing, and medical imaging, to name a few applications. Without requiring hardware replacements, the use of FPGA expands the product life by updating data stream files. Additionally FPGAs have grown to have the capability to hold an entire systems on a single chip. The goal of this project is to build a prototype ultrasonic signal processing platform using an FPGA. The platform acquires ultrasound data at the speed of 100 million samples per second. The embedded system running on an FPGA is reprogrammable to test new signal processing algorithms and new NDE standards/methods. To demonstrate the system, a split spectrum processing algorithm is implemented and the result is displayed on a touch screen LCD. Thanks to the flexibility of FPGAs, the platform is not limited to ultrasound NDE application. It may have a broader impact on future project development for signal processing research and education.

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**Display: 34**

**Project Title:** Design of a Hydrocephalic Shunt System with a Power Source for Active control  
**Student Presenters:** Michael Tednes, Brandon Coates, Elyse Padgett, Margaret Malone  
**Faculty Mentors:** Dr. Kalyani Nair, Dr. Martin Morris  
**Department:** Mechanical Engineering  
**Undergraduate Project**

**Abstract:** Hydrocephalus is a condition where the ventricles within the brain produce an excessive amount of cerebrospinal fluid. Previous treatment options utilized a one-way pressure valve, called a shunt, to drain the excess fluid. This treatment saw many failures as the proximal catheter leading to the shunt would get occluded with tissue. A hypothesized solution to this failure is the addition of a micropump within the shunt to regularly clear the proximal catheter. Previous studies led to the selection of a Bartels mp6 piezoelectric micropump for the system. Necessary for the operation of the micropump is a power source, a bio-compatible casing, and other circuitry components, all of which are being developed in this project. Other features researched in this project include a remote on/off switch for patient safety, and programming to allow appropriate runtime for the pump. Testing was conducted to determine the voltage needed to power the micropump. The micropump showed flow consistency of 3.7-4.3 mL/min when the voltage ranged from 2.5-5.0 volts. The end product of the project is a battery selection to reach a benchmark of a 5 year lifetime, a remote on/off switch, and two casings for both the mp6 micropump and the battery components.
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Project Title: GPS and Inertial Sensor Fusion
Student Presenters: Anton Volkov, Aleksey Lykov, William Tarpley
Faculty Mentors: Dr. In Soo Ahn, Dr. Yufeng Lu
Department: Electrical and Computer Engineering

Undergraduate Project

Abstract: An inertial navigation system (INS) or inertial measurement unit (IMU) is a form of dead reckoning navigation system that uses a combination of accelerometer and gyroscope sensors working in concert to detect displacement relative to a starting point. The system measures both linear accelerations given by its accelerometer and angular velocity changes from its gyroscope. World referenced-frame acceleration data can then be integrated to calculate the velocity and position of the sensors over time, but because the INS can only measure motion relative to a starting location, the initial position must be supplied by some outside system (in the case of this project, using a Global Positioning System (GPS) receiver). Additionally, to compensate for the drift in the inertial navigation system caused by various defects in inertial sensors, the outside references (GPS and barometer) must be polled occasionally to correct for the position error. Using a Raspberry Pi microcomputer as the base system and an MPU 9150 IMU, an inertial navigation system will be developed. Kalman Filtering with GPS and barometer data will be used to complete a “strapdown solution” - a closed-loop system which can self-correct for error.

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Project Title: Global Localization and Position Tracking for Mobile Robot with Stochastic Method
Student Presenter: Hui Zhang
Faculty Mentor: Dr. Joseph Chen
Department: Manufacturing Engineering

Graduate Project

Abstract: This poster proposes a precise localization system for mobile robots with the aid of Radio Frequency Identification (RFID) technology and the Markov Chain Monte Carlo (MCMC) optimization algorithm. By integrating the RFID module, RFID tags, a mobile robot and an off-board computer together, the localization system uses RFID signal code and signal strength as sensor model information and optimizes estimated location of the mobile robot via stochastic method - MCMC. This poster focuses on explaining the development of RFID sensor model and the processes of building the MCMC algorithm. For sensor model development, the effects of orientation between the RFID reader and RFID tag and the velocity of the mobile robot are investigated. For the MCMC method, a sequential Monte Carlo method is adopted to optimize the result. Finally, the experiment results indicate that the proposed localization system has low error both in global localization and position tracking. Thus, the proposed localization system could be used to effectively locate mobile robots.
Guanqun Cao presents his research, “Textpresso: a full text search engine for ciliate literature” at the 2014 Student Expo
(project abstract on page 21)

Hayk Avagyan presents his research, “Network connectivity analysis in wireless sensor networks” to Judges Dr. Prasad Shastry and Dr. Kalyani Nair at the 2014 Student Expo
(project abstract on page 19)
“Reading, Writing, and Fitness: A Sixth Grade Classroom Partnership presentation at the 2013 AMLE Conference”

“I gained ideas and strategies to bring to my future classroom. As a pre-service teacher, this opportunity not only prepared me for the realities of the education field, but also made me excited to begin my teaching career.”

-Alyssa McClenthen

“Alyssa McClenthen and Megan Hickey
Faculty Mentor: Jana Hunzicker

“Co-presenting at the AMLE Conference was an incredibly valuable experience. We received feedback from educators around the country who had a wealth of similar experiences, suggestions, and modification ideas to share. I have come away from this experience with more notions for teaching as well as more confidence in my abilities.”

-Megan Hickey
Display: 37
Project Title: Vital Signs Monitoring in Outpatient Physical Therapy Practice
Student Presenters: Abby Allen, Brittany Mulderink
Faculty Mentor: Dr. Stacie Bertram
Department: Physical Therapy
Graduate Project

Abstract: Introduction: This study investigated the practice and barriers to assessment of vital signs (VS), height and weight by outpatient physical therapists during initial patient examination. Methods: Sixty-seven outpatient physical therapists completed an online survey regarding practice and clinical judgment utilized when assessing VS, height and weight during an initial examination. Results: The majority (82%) of respondents practiced in clinics where VS, height and weight were not assessed by another healthcare professional prior to PT examination. In regards to specific measures, a large percentage of respondents indicated “rarely or never” assessing pulse (41%), blood pressure (36%), respiratory rate (64%), temperature (97%), height (42%) and weight (40%). In comparison, a small percentage indicated “always” assessing pulse (8%), blood pressure (6%), respiratory rate (1%), temperature (0%), height (16%) and weight (16%). Respondents cited “patient did not have a current cardiorespiratory pathology” (69%), as the main reason they may not assess VS at initial examination. Lack of equipment was not a barrier to VS assessment with the majority indicating they had access to blood pressure cuffs, stethoscopes, and scales. Seventy three percent of respondents indicated completing a course in differential diagnosis in PT coursework. Conclusion: The majority of outpatient physical therapists are not routinely assessing VS, height and weight during initial patient examination. Access to equipment and lack of preparatory coursework in PT school were not barriers to assessment.

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Project Title: Serious Games and Gamification of University Education
Student Presenter: Vinay Bhargav Vasudevamurt
Faculty Mentor: Dr. Vladimir Uskov
Department: Computer Science and Information Systems
Graduate Project

Abstract: Serious games (SG) and gamification elements started to be actively used in academic, business, and corporate worlds. The performed analysis of the current status of serious games’ applications in industry clearly shows that it will soon need a significant number of well educated and highly skilled specialists in gamification of main business processes – serious games’ software engineers, analysts, designers, developers, testers, etc. As a result, SG should be actively incorporated into university curriculum, education, and main university processes and activities should be significantly gamified.

Gamification is defined as the use of game mechanics, dynamics, and frameworks to promote desired behaviors. Gamification attempts to harness the motivational power of games and apply it to real-world business processes and serious tasks, including graduate education in colleges and universities. Recent advances in computer technology, mobile technology and mobile software engineering significantly stimulated active research on gamification of processes and activities in “serious” areas such as education, learning, corporate training, management, administration, marketing, simulations of complex physical objects and phenomena, engineering, project management, wellness, healthcare, chemistry, and other areas.
Best schools in the nation already implemented various game-like elements in their education process and curricula. For example, students get points for correct answers and for submitting assignments. At the end of semester they are graded which translates to “badges”. If the students perform well, they get to go to the next semester which is “leveling up”. Given these features, it would seem that school should already be the ultimate gamified experience. However, something about this environment fails to engage students. In contrast, video games and virtual worlds excel at engagement. This motivated the authors – faculty and graduate student at Bradley University to work collaboratively and perform research on serious games applications and gamification of university education.

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Project Title: Factors identified in the physical examination that are associated with lumbar stress injury in individuals with low back pain

Student Presenters: Cowan Brown, Kurt Gottlieb

Faculty Mentor: Dr. Cheryl Sparks

Department: Doctor of Physical Therapy

Abstract: BACKGROUND & PURPOSE: Atraumatic pars fractures occurring in young, athletic populations and have been reported in many sports. Such fractures are difficult to diagnose. There are no known conservative clinical predictors to aid diagnosis. The purpose of this study is to identify variables that may be associated with pars interarticularis fractures. DESCRIPTION: Patients (n=2, 100% female) were referred to physical therapy with medical diagnoses of low back pain. Patient one (age 14) 3 weeks status post injury associated with cheerleading presented with low back pain. Baseline disability was 26% on the Oswestry Disability Index (ODI) and 2/10 Numeric Pain Rating Scale (NPRS). Patient two (age 17) previously active in cross country, presented with low back pain three months after a traumatic fall while tubing on the water. 36% (ODI) and 7/10 (NPRS). Patients underwent a physical examination in effort to find variables associated with spondylolysis. OUTCOMES: Patient one MRI was positive for a L5 pars fracture. Patient two denied MRI imaging and continued with conservative treatment. DISCUSSION-CONCLUSIONS: In this case series, patients presented with low back pain with different mechanisms of injury. Findings from specific tests and measures can be loosely postulated to indicate pars fractures. These variables may include increased training volume, young, athletic, lumbar hyperlordosis, pain with lumbar rotation, pain with lumbar extension, rising from a seated position, one legged hop test, a positive repeated movement screen, and rising from a supine position to a standing position. Further research is warranted to increase the validity of the variables.
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**Project Title:** Assessing Single Leg Balance in Injured and Non-Injured Lower Extremities Utilizing the Proprio 5000  
**Student Presenters:** Justin Boumstein, Jennifer Schrage  
**Faculty Mentor:** Dr. Steven Tippett  
**Department:** Doctor of Physical Therapy  
**Graduate Project**

**Abstract:** Introduction: The purpose of this study was to develop a protocol for the Proprio 5000 and to utilize the protocol to measure single leg balance among injured and non-injured individuals. The quantifiable measures afforded by the Proprio 5000 can assist in determining whether an individual with lower extremity injury has returned to their prior level of function in order to reintegrate into previous activities. Methods: Subjects were tested on the Proprio 5000 to assess reactive balance in perturbed single leg stance. The data collected included the Dynamic Motion Analysis (DMA) score, total time subjects were able to maintain balance on the Proprio 5000, and six independent directional values. Results: Subjects included 53 individuals between the ages of 18 and 40 years of age. Thirty-eight of the subjects had no prior history of lower extremity injury and 15 subjects reported prior knee or ankle injury. Statistically significant differences (p=0.00) were found between injured versus non-injured lower extremities for DMA, total time, and all six directional values. Statistically significant relationships (p=0.05) were also present among DMA, total time, and multiple directional values in subjects with prior knee and ankle injury. Conclusion: The Proprio 5000 can be a useful tool in evaluating single leg balance in injured and non-injured individuals. Significant differences exist when comparing single leg balance in subjects with lower extremity injuries utilizing the Proprio 5000.

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**Project Title:** Physical Therapy Student Self-Assessment of Competence and Frequency of Exposure to Entry-Level Standards: Survey Development and Reliability Study  
**Student Presenters:** Carey Dahlquist, Michael Derry  
**Faculty Mentor:** Dr. Priscilla Weaver  
**Department:** Physical Therapy  
**Graduate Project**

**Abstract:** Background & Purpose: PT programs are expected to prepare graduates to be competent in the knowledge and skills to practice as a PT. There is no instrument that evaluates student competence or exposure to entry-level skills upon completion of their curriculum. An instrument that measures these criteria can identify content areas that warrant more or less exposure in the curriculum as well as further inform students of areas for professional development. The purpose of this pilot study was to develop a reliable survey to measure competency and frequency of exposure to entry-level skills. Methods: The survey was developed using components of APTA’s recommended entry-level skills for a new graduate. The survey asked the students to rate their competence and frequency of exposure on these skills using two Likert-type scales. The survey was reviewed by five PT students and validated by an expert panel composed of four BU faculty. The survey was distributed to the second year BU PT students twice with at least one week apart for a test-retest reliability analysis. The data was de-identified to ensure anonymity among peers. Results: A total of 16 students completed the survey twice and were included in the test-retest reliability analysis. Pearson’s correlation revealed good reliability (competency r=.883; frequency r=.931). Conclusion: The survey and study protocol were concluded to be feasible and reliable with multiple administrations. This instrument will
be used to enhance BU’s PT program to prepare entry-level professionals and inform new graduates on areas for professional development to meet the demands of healthcare.

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Project Title: A systematic review measuring the long term outcomes of patients who underwent a total knee arthroplasty “fast-track” clinical pathway
Student Presenters: Jim Dyer, Tom Bangert
Faculty Mentors: Dr. Steven Tippett, Dr. Carmen Kirkness
Department: Physical Therapy
Graduate Project

Abstract: Introduction: The aim of this study is to determine the long-term outcomes of patients who underwent a TKA “fast-track” clinical pathway. Methods: Data was collected searching Sport DISCUS, CINAHL and Pubmed using the search terms (TKA or total knee arthroplasty) ("fast track" OR "accelerated clinical pathways" OR "early discharge"). A total of 130 articles were narrowed down by reviewing abstracts removing any articles unrelated to total knee arthroplastys. Articles were saved into Zotero, and Zotero removed any duplicates of articles narrowing the list to 79. Articles were included if they met the following inclusion criteria: results measured elements related to acute hospital physical therapy post operatively and WOMAC was a primary outcome measure. Results: Three articles met the inclusion criteria and will be analyzed to further understand the long term outcomes after a TKA “fast-track” pathway. The final three articles used WOMAC as a primary outcome measure and collected data ranging from 6 weeks post discharge to 24 months. Conclusion: Many articles measuring the effects of TKA clinical pathways measured outcomes including but not limited to ROM, patient satisfaction survey’s, length of stay, and readmissions as indicators of success. Future research needs to be done using validated outcome measures such as the WOMAC and data needs to be collected long term to understand the long term effects of using a “fast-track pathway.

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Project Title: The effect of text messaging on gait in unimpaired middle school children with and without obstacles
Student Presenters: Anna Fee, Stephanie Schnitker
Faculty Mentor: Dr. Melissa Peterson
Department: Physical Therapy
Graduate Project

Abstract: The effect of text messaging on gait in unimpaired middle school children with and without obstacles. Introduction: It has been calculated that roughly 200,000 text messages per second were sent in 2010. Furthermore, one-third of middle school children text. Because texting requires use of vision, cognition, and motor skills, it may have a negative influence on gait. Methods: Children in grades 5 through 8 participated in 3 walking trials for each of six different conditions including non-texting, texting, followed by small obstacle ambulation and big obstacle ambulation with and without texting. Results: Repeated measures analyses of variance were conducted to compare the differences between varying gait conditions for velocity, cadence, step length, step width, and step length differential. Participants walked at a slower velocity with shorter steps when texting compared to baseline walking. These variables also declined when participants were asked to step over obstacles in the walkway while texting. However, participants walked at a faster
velocity with longer steps when texting and stepping over obstacles compared to level surface walking while
texting. Conclusion: Texting in the middle school population causes changes in velocity, step length, and
cadence. Because these changes deviate from a child’s normal walking pattern, they could lead to increased
risk of injury in an otherwise safe activity such as walking. The decrease in velocity suggests that middle
school children prioritize texting over walking. This could be especially precarious when navigating obstacles
such as curbs or cracks in the sidewalk.

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Project Title: Playground Preferences and Support Needs for a Child with Physical Disability: A Case Study
Student Presenters: Adair Gardner, SPT, Shannon Bowar, SPT
Faculty Mentor: Dr. Brenda Pratt
Department: Physical Therapy
Graduate Project

Abstract: OBJECTIVE: To determine play activity preferences and play support needs of an ambulatory
child with physical disabilities during playground play. METHODS: An 8-year old female with left limb
involvement participated in this case study. Participant attended a general education classroom and had
difficulties with higher level locomotor skills as well as gross and fine motor skills with left arm. During 3
data collection sessions the participant played for 30 minutes each on two different community playgrounds
with an intervening rest period. Playground A had a wooden community designed and built structure.
Playground B had a plastic and metal playground structure. OUTCOME MEASURES: Participant’s play
activity preferences and support needs were measured using behavior mapping, an observation method of
collecting data on targeted behaviors and locations simultaneously. Descriptive statistics were used for data
analysis. RESULTS: Sixteen of the 20 play activities on playground A were chosen by the participant. For
playground A, independent and assisted play engagements were observed on eight play activities respectively.
Twelve of the 17 play activities on playground B were chosen by the participant. For playground B,
independent play engagements were observed on eleven play activities and assisted play engagements were
observed on one play activity. CONCLUSION: The participant in this study engaged in over half of the play
activities available on each playground. On playground A, the participant required assistance from others to
engage with eight play activities and one play activity on playground B required assistance. Playground B
appeared to support more independent play.

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Project Title: An Innovative Approach to Incorporate QSEN Patient-Centered Care Competencies into Nursing
Curriculum via the Utilization of a Therapy Dog for Animal-Assisted Activities in a Grade School
Student Presenters: Jennifer Lapke, Jessica Lenartowicz
Faculty Mentor: Dr. Kelly Schwend
Department: Nursing
Undergraduate Project

Abstract: In order to incorporate quality and safety education (QSEN) patient-centered care competencies
into the undergraduate nursing curriculum, an innovative approach was implemented in a senior-level
community clinical utilizing a therapy dog to provide animal-assisted activities (AAA) at a grade school
clinical site. The utilization of dogs for AAA in schools has demonstrated educational, motivational and calming benefits for children. Tilly, an Australian Shepherd-Poodle mix, performed AAA by being a calming presence and a distraction to children who were sent to the nursing students for care of injuries and illnesses. Tilly and her handler, a senior-level nursing student, presented numerous, developmentally appropriate educational programs for children 3-12 years of age. Topics presented included how to approach a dog, nutrition, dental care, immunizations, and the importance of routine health examinations. Tilly was able to consistently capture and maintain the children’s attention for all teaching presentations. The QSEN patient-centered care competency is centered on providing compassionate and coordinated care based on the patient’s preferences, values and needs with the integration of education, physical comfort and emotional support. Therapy dogs can offer opportunities to children for developmentally appropriate education on numerous topics and provide comfort and emotional support when they are ill or injured. The utilization of dogs for AAA with school-age children fulfills the patient-centered care competency to engage in partnerships that promote health, safety, well-being and self-care management. This novel approach was a success by providing relevant and unique teaching and learning opportunities for both the nursing student and the children.

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Project Title: Community Belonging in Graduate School
Student Presenter: Emily Lawrence
Faculty Mentor: Dr. Kathleen Buchko
Department: Human Development Counseling - Clinical Mental Health Counseling
Graduate Project Abstract: Entering into graduate school is an exciting life transition. Graduate students anticipate exploring such horizons as classes focused on their specific area of interest, opportunities to work alongside experts in the field, membership in honor societies, and many more. One aspect of graduate school that seems to be less explored is the social transition which students experience. Social transition is influenced by a variety of factors; including age, family, and type of graduate program, to name a few. This quantitative study includes self-report data via survey from both current graduate students and alumni of Bradley University’s College of Education and Health Sciences. The survey was administered via personal emails and Facebook messages, as well as administration individually and in graduate counseling classes. The survey includes 16 questions including the factors mentioned above, demographic variables, and checklists of other potential factors; all independent variables. A 5-point Likert scale and a forced choice (yes or no) question concerning degree of “community belonging” which was operationally defined by “feeling at home, connected, socioemotionally supported” in graduate school is the dependent variable. A non-directional hypothesis was postulated since the researcher suspected a relationship but not specific to a particular independent variable. At this point in the study, approximately 75% of participants agreed or strongly agreed that feeling community belonging (feeling at home, connected, socioemotionally supported) in graduate school is/was important to them. The data are currently being analyzed for additional results to be included in the final poster presentation.
Project Title: Parents' Knowledge and Attitudes on Concussions in Their High School or College Athletes

Student Presenters: Kelsey Nevell, Matthew Schultz

Faculty Mentor: Dr. Robert Bertram

Department: Doctor of Physical Therapy

Graduate Project

Abstract: Introduction: Parents of athletes are often not aware of the signs, symptoms and significance of suffering a concussion. There is lack of information about whether or not poor knowledge of concussions plays a role in pulling a child from sport and allowing early return to play. We want to find out what parents already know about concussions and how they feel about letting their child return to play after a concussion in order to increase the safety of young athletes. / Methods: We created a survey that thoroughly assesses the knowledge of and attitudes about concussions of the reader. We contacted three coaches of various sports teams in the Peoria, IL area. They were sent an online survey to send to the parents of all their athletes. We received responses online from anonymous parents. The data was collected and analyzed. / Results: A total of 98 parents completed the survey. Parents were scored on the number of knowledge questions they answered correctly. The results showed that parental knowledge of concussions was higher if their child had experienced an injury to the head, neck or jaw. Parental knowledge was also higher the longer their child has been playing their sport. Parents of athletes who will pursue an athletic scholarship or professional career in their sport would allow more concussions before permanently removing their child from play. The parents of higher level athletes were also less likely to let their child return to sport without medical clearance. All of these results were statistically significant. / Conclusions: Parents of athletes are vital in making health decisions when it comes to concussion injuries. We need to ensure that parents of athletes are aware of the signs and symptoms of concussions in order to make educated decisions about taking a child out of sport and allowing return to play. Parents of athletes at lower levels of competition have the greatest need for concussion education. With the cooperation of the players, parents, coaches and other health professionals we can enhance the safety of young athletes. In addition to this, more research is needed in order to determine and establish guidelines around the prevention, identification, treatment and management of concussions.

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Project Title: Effects of Rocker Bottom Footwear on Joint Range of Motion During Gait

Student Presenters: Samson Nguyen, Michael Holloway

Faculty Mentor: Dr. Dawn Hall

Department: Physical Therapy

Graduate Project

Abstract: Background/Purpose: Rocker bottom shoes are modified footwear that create an unstable platform. There is little research on the effects of these shoes on joint range of motion during gait. The purpose of this study was to investigate the joint angles at the knee and ankle during the phases of gait while wearing rocker bottom footwear. Methods/Participants: Thirty-three participants (20 females, 13 males; mean age±SD=24±3 years) walked on a treadmill in three different conditions: wearing regular flat sneakers, socks, and rocker bottom shoes. The joint angles of the knee and ankle were measured using Dartfish software and analyzed with SPSS. Results: Rocker bottoms increased knee flexion from initial contact through
Pre-swing (p<.05), decreased knee flexion at initial swing (p<.05), and increased plantarflexion (p<.05) at pre-swing when compared to regular shoes. Compared to socks, rocker bottoms increased knee flexion at terminal stance, initial swing, and mid-swing (p<0.5) and increased plantarflexion throughout the entire gait (p<.05). Discussion/Conclusion: Results suggest that wearing rocker bottoms changes the joint range of motion at the knee and ankle during gait. These shoes may increase risk for falls, especially in patients with inadequate quadriceps and plantarflexor muscle strength. Increased knee flexion during stance places additional stress on the quadriceps and can increase knee instability/buckling. Increased plantarflexion during swing phase reduces foot clearance, thus increasing risk for falling. In healthy individuals, rocker bottoms may be used to improve balance and eccentrically train the quadriceps and dorsiflexors.

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Project Title: The tire flip: Kinematic analysis of lifting techniques
Student Presenters: Joe Olofsson, John Zegar
Faculty Mentor: Dr. Joseph Kelly
Department: Physical Therapy
Graduate Project

Abstract: Introduction: Tire flipping is a new approach to strength and conditioning training. While popularity grows, more and more individuals are exposed to this exercise activity but do not receive proper safety instruction. The specific aim of the study was to compare two competing techniques for safety and performance Methods: Eleven high level athletes (27.8±7.11 years) were recruited to flip a 494 lbs tire. Technique A (deadlift-style) and technique B (football stance) were instructed. An accelerometer was used to measure tire acceleration and a high speed camera was used for motion analysis of the athlete. Subjects completed the first technique and were given 10 minutes recovery before attempting the second technique. The videos were analyzed using Dartfish TeamPro software. The study was repeated a second day with 5 of the 11 athletes. Subjects served as their own control. Results: Technique B angular velocity was significantly greater than technique A (p=0.035), tire acceleration approached a similar significance (p=0.65) for day 1. Day 2 did not reveal this trend using a smaller sample size (n=5). No significant difference was found between days in technique A (acceleration and angular velocity) and B (acceleration) but there was a significant difference in angular velocity in technique B. No significant anthropometric correlations were found. Conclusions: Results suggest technique B yields both greater performance and safety compared to the more popular technique in high level athletes. Further studies utilizing a more general population will help to expand the generalizability of the results.

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Project Title: Effects of Culture on Physical Activity Behaviors in Italy and the United States: a Case Study
Student Presenter: Dana Pine
Faculty Mentor: Dr. Brenda Pratt
Department: Health Sciences
Undergraduate Project

Abstract: Objective: To document the effects of culture on personal, social environmental, and physical environmental factors on physical activity behaviors. Methods: One female college student participated in
this case study. Physical activity (daily step counts) were assessed using the Fitbit One pedometer during academic semester (4 consecutive weeks) in Italy and Illinois. Behavior mapping was used to determine personal, social and physical factors related to physical activity. Behavior methods were linked to physical activity. Results: Mean steps taken a day in Italy were about 15,288.7 steps (range: 13,463-16,430) while in the United States the mean daily steps were about 6,366.5 (range: 4,967-6,956). Higher step counts in Italy were linked to personal factors (motivation and attitude), physical environmental factors (residential design and location of goods and services), as well as social environmental factors (academic influence and perceived safety). Lower step counts in Italy were linked to electronic use and academic calendar. Higher step counts in the United States was linked to desirable weather and work related activities. Lower step counts in the United States was linked to personal factors (lack of motivation), social environmental factors (availability of transportation and electronic use), and physical environmental factors (poor residential design and perceived lack of safety). Conclusion: Culture appears to have influenced the physical activity behaviors of this individual. Overall physical activity was greater in Italy than the United States.

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Project Title: A Study of the Effects of Homework Delivery Methods on Exam Performance
Student Presenter: Emily Roth
Faculty Mentors: Dr. Jose Lozano, Dr. Kevin Kimberlin
Department: Physics & Secondary Education
Undergraduate Project

Abstract: Is electronic homework more effective than written homework on student exam performance? For the past 18 months we have studied 5 sections of algebra-based introductory mechanics at Bradley University. The factors we analyzed were electronic homework completion time, written and electronic homework scores, and average exam scores. All sections were taught in the traditional format and with very similar pedagogy. The results of this study will be discussed, specifically the effects of homework completion time on exam performance and the correlation between homework scores and exam performance.

Display: 53
Project Title: Investigating the Effects of Text Messaging on Reactive Balance
Student Presenters: Lauren Schlinsk, Tyler Lampe
Faculty Mentors: Dr. A.J. Strubhar, Dr. Melissa Peterson
Department: Doctor of Physical Therapy
Graduate Project

Abstract: Introduction: The aim of this study was to determine the effects of text messaging on reactive body-to-surface orientation. Methods: Thirty-two participants stood under various conditions with a cell phone while undergoing a mild platform perturbation in anterior/posterior (AP) and lateral directions. The amount of total body movement during the perturbations was measured. Less body movement was considered better reactive body-to-surface orientation. The PROPRIO 5000TM system was used for the perturbation and measurement. The conditions tested were standing holding the cell phone (control), looking at the phone, reading a message, and texting. Repeated-measures ANOVA with post-hoc analyses were performed. Results: A significant difference was found between the means of the total body movement in all
conditions in AP and lateral perturbations (Fap=16.45, Flat=9.79, p < .00). Post-hoc analysis revealed a difference (p < .00) between the mean total body movement in the control and reading conditions (map-control=38.19, map-reading=42.50; mlat-control=59.25, mlat-reading=63.91), and between the control and texting conditions (map-control=38.19, map-texting=43.00; mlat-control=59.25, mlat-texting=73.03). No significant differences were found between the control and looking conditions or between the reading and texting conditions for any trials. Conclusion: The data implies that body-to-surface orientation is negatively affected by reading and sending text messages. Instead of staying upright, individuals tend to move with the platform while reading and texting. Discussion: The findings suggest distraction on multiple levels such as the reading (visual-cognitive distracters) and texting (visual-cognitive-fine motor distracters) alter body-to-surface orientation during a mild perturbation and potentially could cause a loss of balance. Key Words: texting, reactive balance, proprioception, body surface orientation.

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Project Title: The Feasibility of Measuring the Physical Activity of Non-Ambulatory Children with Physical Disabilities in Physical Education Class using Actigraph Accelerometers
Student Presenters: Carolyn Sobieski, Ross Johnson
Faculty Mentor: Dr. Brenda Pratt
Department: Doctor of Physical Therapy
Graduate Project

Abstract: Objective: To determine the feasibility of using accelerometry to measure the physical activity (PA) of children with non-ambulatory physical disabilities during school physical education (P.E.). Methods: Two participants, dependent in transportation while seated in a manual wheelchair, were studied over a period of 4 P.E. classes (average of 24.9 minutes) during a 2 month period. PA was measured using accelerometers placed on each participant’s head and dominant arm and ankle. The accelerometer data was evaluated using ActiLife software to determine the amount of time spent in different activity levels. Active and passive movements of the head, wrist, and ankle were measured using behavior mapping which was audio recorded and later transcribed for descriptive statistics. Results: Based on accelerometer data, participant 1 spent an average of 88.675%, 7.2%, 2.975%, and 1.125% of class time in sedentary, light, moderate, and vigorous activity levels, respectively. Participant 2 spent 83.625%, 12.25%, 3.225%, and 0.9% of class time in sedentary, light, moderate, and vigorous activity levels, respectively. According to behavior mapping, participant 1 spent 4.72% of class time performing active movements, while participant 2 spent 9.92%. Conclusion: Based on behavior mapping, the participants spent little time engaged in active movement. Accelerometry was not able to discern solely active movement, but also measured movement that was passively imposed by assisting adults. Therefore, accelerometry may not be a feasible method to measure PA in this population.
"Spanning the Gap: Does the Younger Generation Practice Ageism and Sexism?"

Courtney Thomas, Meghan Fogler, and Anjonette Baum
Faculty Mentor Dr. Claire Etaugh.
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**Project Title:** Guanyin: The Story of Miao Shan

**Student Presenter:** Mackenzie Porth

**Faculty Mentor:** Dr. Daniel Getz

**Department:** Psychology

**Undergraduate Project**

**Abstract:** Guanyin is a Chinese feminine deity of compassion, healing, and motherhood. Her name, meaning “The One who Observes the Cries of the World,” is a Chinese translation of the Sanskrit Avalokiteshvara, who is a prominent bodhisattva within the Buddhist tradition of Mahāyāna. Bodhisattvas within this tradition are beings who while striving to achieve their own enlightenment seek simultaneously to save all sentient beings in the world. Avalokiteshvara within Mahāyāna scriptures is depicted as carrying out this saving function by means of multiple manifestations, each addressing a particular situation of need. As the Chinese version of Avalokiteshvara, Guanyin underwent a process of change to eventually become a thoroughly Chinese deity. In particular, early Indian and Chinese depictions of Avalokiteshvara as a masculine identity gave way over centuries to Guanyin’s eventual portrayal as a thoroughly feminine figure. This project will examine how some of the various iconic depictions of Guanyin reveal this process in which Guanyin took on Chinese characteristics.

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**Project Title:** Age and Gender in American Psychological Association Awards

**Student Presenters:** Anjonette Baum, Collen Geraghty

**Faculty Mentor:** Dr. Claire Etaugh

**Department:** Psychology

**Undergraduate Project**

**Abstract:** There is a growing body of research regarding ageism; however, to date there is little research investigating the overlap of ageism and sexism. The gap between career choices among men and women is narrowing. The field of psychology, previously a male-dominated profession, has seen a notable increase in women’s participation in psychology graduate and doctoral programs, as well as women’s professional accomplishments. Although the majority of men and women have a desire to have children, it is more common for women than men to experience a disruption in their careers during childrearing. This present study examines whether or not gender and age differences exist regarding the recipients for the seven most longstanding American Psychological Association awards. Sex and age of each award recipient was obtained through internet search, such as LexisNexis, biographies, and obituaries. Overall, men have received significantly more of the longstanding awards than women. Women were found to be significantly older than men at the time of receiving the prestigious award for Distinguished Scientific Contributions. When analyzing all of the awards combined, however, men were significantly older than women at the time of receiving the awards. The proportion of women receiving three of the seven awards increased significantly over time.
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Project Title: *Social and Enhancement Drinking Motives: The Influence of Context*
Student Presenters: Brianna Blackshire, Alexi Cranford, Blair Engerman, Jasmin Buckingham
Faculty Mentor: Dr. Amy Bacon
Department: Psychology and Social Work
Undergraduate Project

Abstract: People drink alcohol to achieve certain outcomes (Cox & Klinger, 1988; 1990). Drinking for enhancement motives (e.g. “because it makes me feel good”) and social motives (e.g. “to be more sociable”) is influenced by positivity and the presence of others. Enhancement motives influence most college students (Sheehan et al., 2013). Few studies have reviewed motives in different contexts, which vary by social norms and drinking levels (Wells et al., 2005). For example, college students drink more at parties (Demers et al., 2002). We expect social and enhancement drinking motives to explain variance beyond typical alcohol use, gender, and age when drinking at home with friends or at parties. / Students who are current drinkers (N = 145; Mage = 19.02 years [SD = 1.67]; 72.9% female) completed questionnaires assessing demographics, problematic alcohol use, drinking motives, and amount of alcohol consumed in varying contexts. Results of two hierarchical multiple regression analyses indicated social and enhancement motives explained a significant amount of variance (6%) when drinking at parties, over that explained by age, gender, and problematic drinking (Full model = 50.6% variance explained; R² Δ = .06, FΔ (2, 137) = 8.68, p < .001). Social and enhancement motives failed to contribute significantly (0.9%) to alcohol consumption at home with friends (Full model = 20.7% variance explained; R² Δ = .01, FΔ (2, 137) = .77, p = .47). These findings can assist with prevention of problematic drinking patterns, by identifying that students may be trying to achieve specific goals with alcohol that vary by context.

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Project Title: *Qi and Spirituality in Falun Gong: Examining the Problem of Contemporary Chinese Identity*
Student Presenter: Aaron Hoover
Faculty Mentor: Dr. Daniel Getz
Department: Religious Studies, International Studies
Undergraduate Project

Abstract: Falun Gong is an enigmatic sect in China that has become the object of questions concerning its true identity and aims since its persecution by the Chinese government starting in 1999. As a part of the qigong movement, Falun Gong has placed focus on cultivation aimed at adjusting qi. More importantly, it has put greater emphasis on spirituality than other qigong groups. This project seeks to understand the concept of qi in its historical context, to clarify the relationship between qi and spirituality in Falun Gong, and to examine in light of this research on the concept of qi how Falun Gong teaching and practice addresses the problem of identity within contemporary Chinese society.
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Project Title: Cognitive Dissonance and Attendance of Bradley Athletic Events
Student Presenters: Matt Iannacco, Matt Smothers, Ashley Arendt, Elizabeth Thompson
Faculty Mentor: Dr. Ji Young Kim
Department: Advertising
Undergraduate Project

Abstract: Bradley University has a rich history of athletics dating back to the school’s inception in 1897. Basketball, Baseball, Soccer, Volleyball, and at one point, even Football were sports that Bradley students attended. The objective of this research is to find out plausible explanations as to the reason in decline of ticketed athletic events at Bradley University. The conducted research can help determine any changes that Bradley University, and its athletic department, can make to encourage a higher attendance rate at athletic events. The means of collecting data is by conducting an online survey that will be sent to students at The University of Illinois, and Illinois State University. That data will be analyzed and compared to students who took the same survey at Bradley University, in an effort to come to a solution. The expected results of the study is not one specific reason, but a list of ideas or opinions in order to better understand the student population. Our research should help shed light on the empty seats at Bradley University athletic events, and provide options to fill them.

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Project Title: Chinese Religion and the Shaolin Tradition
Student Presenter: Aaron Meredith
Faculty Mentor: Dr. Daniel Getz
Department: Interactive Media
Undergraduate Project

Abstract: This project is a study of the origins of the Chinese Shaolin school of martial arts and its interconnectedness with ancient Chinese philosophy and religion. The project first demonstrates how we of the “Western” world have come to observe martial arts and the Shaolin tradition in particular. It then addresses how we overlook the philosophical and religious basis that the practices of Shaolin martial arts are steeped in. In order to rectify this oversight, the project explores how the mindsets of Confucianism, Daoism, and Buddhism influenced the eventual development of these arts. Research for this project draws upon available scholarly literature as well as personal observations on how these traditional philosophies and religious traditions permeate everyday life.

Display: 62
Project Title: The Question of Identity as a Chinese Catholic
Student Presenter: Kathleen O’Brien
Faculty Mentor: Dr. Daniel Getz
Department: Philosophy and Religious Studies
Undergraduate Project

Abstract: China today is undergoing dramatic economic, political, and cultural changes. This rapid transformation has deeply affected how the Chinese view themselves. To make sense of these profound
changes around them, Chinese individuals have been provoked into asking the big questions. Among these are the questions who am I and what is the purpose of my life? Though a minority of ten million within the vast population of China, Chinese Catholics have found the answers to these questions in their faith and Church. Despite the fact that Catholicism provides solid answers for some Chinese Catholics, the question of identity as a Chinese Catholic offers challenges for many others due to the tension between the Church and Chinese government. This research project will seek to illuminate through Arthur Kleinman’s model of the divided self how individuals makes sense of their identity as members of both the Catholic Church and Chinese society.

**Display: 63**

**Project Title:** The Effect of Daoism on the Chinese Relationship to the Environment  
**Student Presenter:** Maura O'Brien  
**Faculty Mentor:** Dr. Daniel Getz  
**Department:** Philosophy and Religious Studies  
**Undergraduate Project**

**Abstract:** Nature has been an integral aspect of everyday Chinese life for thousands of years. This is shown in the religions of China and more specifically in Daoism. In Daoism, nature plays a central role. The Daoist belief is that humans and nature need to be in a state of harmony and that they are together not separate. Chinese scholar gardens serve as symbolic landscapes revealing Chinese beliefs about being in nature as well as retreats providing an escape from reality. This project seeks to clarify the relationship between Chinese philosophical concepts about nature and scholar gardens, particularly the Humble Administrator Garden of Suzhou. The project will also explore how these concepts and gardens might provide insight and inspiration in helping address China’s growing environmental crisis.

**Display: 64**

**Project Title:** Girls, Human Security and Reintegration of Child Soldiers: A Re-evaluation of Strategies  
**Student Presenters:** Casmeer Reyes, Eileen Prescott  
**Faculty Mentor:** Dr. Jeanie Bukowski  
**Department:** International Studies  
**Undergraduate Project**

**Abstract:** An estimated 300,000 child soldiers are involved in today’s armed conflicts. Female child soldiers constitute between a tenth and a third of children recruited in armed conflict (Fox, 2004: 465). However, current disarmament, demobilization and reintegration (DDR) programs insufficiently address the effects of the gendered treatment that female child soldiers face; their roles, ranging from combatant to domestic sex slave, have exposed them to extreme forms of violence and indoctrination that continue to dictate their post-war identities (Denov, 2006: 320). This paper considers the existing research from a variety of disciplines that addresses female child soldiers in Sierra Leone, Uganda, and the Democratic Republic of Congo. We consider 41 studies, first categorizing them along the following dimensions: source type, date of study, discipline, country studied, sample, methodology, and research design. Second, we categorize the recommendations made in the studies regarding necessary factors in successful reintegration programs. These suggestions are grouped into the following areas: education, economic, physical health, mental health, community relations,

Display: 116
Project Title: Investigating the Role Medicine Plays in Shaping Personal Identity in Contemporary China
Student Presenters: Alex Sadauskas, Sahir Mohammad
Faculty Mentor: Dr. Daniel Getz
Department: Biochemistry and Religious Studies
Undergraduate Project

Abstract: Ever since the Opium War in the mid-1800s, some Chinese reformers have shown an inclination toward incorporating Western practices into Chinese life. The adoption of Western ways conflicted with keeping strong ties to traditional ideas and gave rise to identity confusion in China. This identity crisis has intensified in recent decades and permeates all aspects of Chinese life. A question arises as to whether traditional Chinese views on medicine as well as conventional Chinese medical practices have been able to maintain immunity from the challenges and turmoil of this crisis in identity. This project poses that question and examines the status of traditional Chinese medicine in contemporary society. It will show how traditional procedures such as acupuncture, moxibustion, and cupping, which are still widely practiced, are based on a model of medicine in which the biological, social, and spiritual dimensions of the individual are integrated. A contrast will be drawn with Western medicine that focuses on the isolated individual and puts emphasis on a biochemical approach seeking to restore health through drugs. Finally, the project will reflect on how the formation of personal identity in contemporary China might be shaped by the conversation between these divergent models of medicine.

Display: 65
Project Title: Critical Reflection in Relation to Design Research
Student Presenters: Sydney Schneider
Faculty Mentor: Dr. Kendra Brandes
Department: Retail Merchandising
Undergraduate Project

Abstract: The International Textile and Apparel Association, ITAA, is calling for research and contextualization of a design discipline in the textile and clothing field. To bridge the gap between research and practice, the methodology in which design research can be justified is critical reflective practice. This study attempts to characterize design research as a valid scholarly activity through the method of reflective practice or to have the capacity to reflect in and on action so as to engage in a process of continuous learning (Schön, 59 1983). The framework for reflective models have been derived and adapted from Schön 1983, Gibbs 1988, Johns 1994, and Kolb 1984. Just as professionals seek inspiration through cultural immersion,
this project was structured in this manner. Studying abroad in Florence, Italy, provided a diverse collection of experiences in which constant observation and reflection, in a journal format, took place. In the understanding that material goods reflect culture, Italian textiles were selected as the representation of Italian culture for creation of an artifact. They were then used in the process of creating an original garment design developed through draping techniques. Throughout the entire design process, observation and reflection were documented as steps in the method of reflective practice. Experiences and reflections were examined within the models of reflective practice by Gibbs Reflective Cycle (1988) and Kolb’s Experiential Learning Cycle (1984). Preliminary analysis of reflection within these models shows introspection and transformational learning (Mezirow, 1997).

Display: 66
Project Title: Presidencies of Psychological Associations: How Far Have Women Come?
Student Presenter: Courtney Siemsen
Faculty Mentor: Dr. Claire Etaugh
Department: Psychology
Undergraduate Project

Abstract: Historically, women have been largely underrepresented within the field of psychology. The second stage of feminism in the late 1960’s and 1970’s coincided with an increase in the number of doctorates in psychology awarded to women, as well as efforts to enhance the status of women within the American Psychological Association (APA). The current research examines whether there was an increase in the number of women elected to presidencies of both APA and the three oldest regional psychological associations from 1980 until the present time. Data were collected by consulting the archives of the associations and analyzed for gender trends. Consistent with our prediction, analyses revealed that a significantly larger number of women were elected into presidencies of psychological associations in the years following the second stage of feminism.

Display: 67
Project Title: Lei Feng and the Chinese Identity.
Student Presenters: Michael Teague
Faculty Mentor: Dr. Daniel Getz
Department: Chemistry
Undergraduate Project

Abstract: Lei Feng was a soldier in the People’s Liberation Army of China who after his death in 1962 came to be viewed as someone whose life should be emulated. Mao Zedong placed Lei Feng on a pedestal to help propagate the Communist Party and its ideals. A propaganda campaign beginning in 1963 cast Lei Feng as a hero who was selfless, loyal to his country, and did things to help the people. This campaign was summarized in the motto, “Learn from Lei Feng.” The Chinese people were called upon to imitate the qualities of Lei Feng in their daily lives. This project examines the role that the myth of Lei Feng has continued to play in shaping personal identities in the era following Mao, a period in which China has undergone dramatic changes. “The Diary of Lei Feng” is used to identify his values, particularly those associated with his role as a soldier. The project examines different current perspectives on Lei Feng in the context of contemporary
identity formation. On the one hand, the Communist Party of China continues to promote Lei Feng and his values in contemporary society. On the other, skeptics question the validity of these values as instruments of propaganda and even wonder whether the Communist Party may have fabricated the “idea” of Lei Feng.

**Display: 68**

**Project Title:** I Only Thought They Thought It: Emerging Adults’ Self and Parental Body-Image Perceptions and Parent Relationships  
**Student Presenters:** Courtney Thomas, Egle Stravinskaite, Kelly Hernández  
**Faculty Mentor:** Dr. Claire Etaugh  
**Department:** Psychology  
**Undergraduate Project**

**Abstract:** Emerging adult women's body image and body esteem correlated positively with their perceptions of parents' views of their current and ideal bodies, and with the women's relationships with their parents. These associations were weaker for emerging adult men. Findings suggest possible gendered etiologies of subclinical eating problems in emerging adults.

**Display: 69**

**Project Title:** Spanning the Gap: Does the Younger Generation Practice Ageism and Sexism?  
**Student Presenters:** Courtney Thomas, Meghan Fogler, Anjonette Baum  
**Faculty Mentor:** Dr. Claire Etaugh  
**Department:** Psychology  
**Undergraduate Project**

**Abstract:** Many different types of prejudices plague people’s lives, including ageism and sexism. Ageism doesn’t capture the same level of public attention as racism and sexism, but, it is just as prevalent in society. Previous research has indicated that college students perceive elderly men negatively when they violate prescriptive stereotypes (North & Fiske, 2013). However, in other research, the perceptions of college students have been positive toward the elderly. The purpose of this study is to include elderly women in the discussion of the perceptions of college students on ageism. In addition, this study aims at trying to decipher whether college students have a positive or negative view of the elderly with regards to competence and personality. Participants were 128 female and 88 male Bradley students. Each student was given one of four booklets describing an older person, who was wither a female or a male and who displayed either generosity or stinginess with their money. Female stimulus persons were judged as significantly more competent than the male stimulus persons. Generous stimulus persons were rated as significantly more warm/sociable and significantly more competent than stingy stimulus persons. There were no differences in the ratings of female and male participants.
“Analysis of the multiple Peroxide Detoxifying Enzymes involved in the Oxidative Stress Defense of Bacillus subtilis”

“Participating in research has been one of the highlights of my Bradley career. I have especially enjoyed working closely in collaboration with a professor as well as a group of my classmates. All of the skills I have learned, both technical and personal, will undoubtedly be valuable to me in my future career.”

-Alyssa King

“Being involved in research has given me further insight into biological concepts and a hands-on experience that has been beneficial both in and out of the classroom. It has allowed me to work closely with my professor and has opened up opportunities I would not have had otherwise. My research experience has taught me many skills that can be incorporated into graduate school and my career.”

-Nicole Broden

“Participating in research has provided an avenue to extend knowledge from coursework into a research-related project while having the opportunity to work closely with my professor and receive valuable feedback. I believe the skills developed from working on a research project will benefit my future career goals.”

-Gabrielle Dierker

“Participating in research has been one of the highlights of my Bradley career. I have especially enjoyed working closely in collaboration with a professor as well as a group of my classmates. All of the skills I have learned, both technical and personal, will undoubtedly be valuable to me in my future career.”

-Alyssa King

“Participating in research has been one of the highlights of my Bradley career. I have especially enjoyed working closely in collaboration with a professor as well as a group of my classmates. All of the skills I have learned, both technical and personal, will undoubtedly be valuable to me in my future career.”

-Alyssa King
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Project Title: Who Diverged First: An Early Animal Phylogenetics Study Based on Fusion Gene Evidence
Student Presenters: Alex Bollinger, Michael Molter, William Moser
Faculty Mentor: Dr. Nicholas Stover
Department: Biology
Undergraduate Project

Abstract: In a recent Science paper, Ryan and colleagues (2013) argue that Ctenophora (comb jellies) are the earliest diverging animal lineage, citing new multi-gene phylogenies made possible by their sequencing of the model ctenophore Mnemiopsis leidyi. This finding challenges contemporary models based on morphology and embryology, where Porifera (sponges) have long been accepted as the earliest diverging metazoans. Poriferans lack many of the complex features found in ctenophores and other animals, such as tissue organization, neurons, and multiple germ layers. For ctenophores to have diverged prior to sponges would mean multiple acquisitions of these features, by ctenophores and the main metazoan lineage, or their loss in sponges. Because phylogenies produced using morphological and genomic evidence have produced conflicting results, we have undertaken a study using a third method based on the presence or absence of gene fusions among the earliest diverging animals. We have already identified a number of candidate gene fusions using the Gene deFuser software, which was developed previously in collaboration with the Cavalcanti lab at Pomona College. The first gene we have analyzed, which is a fusion between a doublecortin gene and an AGC-family kinase, appears to be fused in bilateria, cnidaria, and trichoplax, non-fused in ctenophores, and completely absent in the sponge Amphimedon. We plan to study a number of the other genes identified by Gene deFuser, and examine how they fit or refute the phylogeny proposed by Ryan et al.

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Project Title: Thermodynamic Study of the Alkylation of beta-Ketoesters
Student Presenter: Brandon Calvert
Faculty Mentors: Dr. Wayne Bosma, Dr. Brad Andersh
Department: Chemistry
Undergraduate Project

Abstract: A reaction was discovered in which β-ketoesters are alkylated at the γ carbon, instead of the α carbon, forming a δ-lactone ring instead of the expected Knoevenagel product. This is surprising because γ-alkylation is the unfavored route, since the α carbon is known to be more acidic. In order to better understand the experimental results, the thermodynamics of the observed and expected reactions is being studied using density functional theory. Four different density functionals and three different continuum solvent models were used during this research. Solvent models are necessary because one of the intermediates is unstable in vacuum calculations. Overall, the four density functionals gave relatively similar relative energies. SM8 differs from the other two solvent models in its relative energies, and other calculations have shown that it gives better results when working with anions. Our results show the lactone-forming reaction to be thermodynamically favored, with the final product at a lower energy than the Knoevenagel product.
**Display: 73**

**Project Title:** Investigating the expression of the peroxidase YkuU in Bacillus subtilis  
**Student Presenter:** Gabrielle Dierker  
**Faculty Mentor:** Dr. Melinda Faulkner  
**Department:** Biology  
**Undergraduate Project**

**Abstract:** Oxidative stress is a substantial problem for aerobic organisms. Reactive oxygen species can result in DNA and protein damage. To combat oxidative stress, peroxidase enzymes degrade reactive oxygen species into less toxic forms. Some peroxidases, such as alkyl hydroperoxide reductase (Ahp), are present in both humans and many bacterial species. Bacillus subtilis serves as a model organism for analyzing oxidative stress combatant mechanisms. Bacillus subtilis has two seemingly identical Ahp enzymes: AhpC and YkuU. The activity of AhpC has been well studied, however, little is known about YkuU. Previous studies in the lab show that ykuU is poorly expressed. Thus, these studies aim to determine what induces the expression of ykuU. Prior studies suggest that AbrB may regulate the expression of ykuU; AbrB controls the expression of genes involved in the transition from exponential to stationary phase during bacterial growth. The expression of other peroxidases in B. subtilis is regulated by the proteins Sigma-B (sigB), OhrR, and PerR; these regulatory proteins respond to peroxide exposure and other environmental stresses. Thus, these four proteins were analyzed for their ability to regulate the expression of ykuU. Our results clearly show that mutation of abrB increases the expression of ykuU; conversely, mutation of sigB, ohrR, or perR does not alter the expression of ykuU. Future experiments will determine if this increase in expression of ykuU results in an increase in resistance to peroxides in B. subtilis.

**Display: 74**

**Project Title:** Detection and Analysis of Insulin Aggregation by Fluorescence Correlation Spectroscopy  
**Student Presenters:** Lauren Duvall  
**Faculty Mentor:** Dr. Edward Remsen  
**Department:** Chemistry  
**Undergraduate Project**

**Abstract:** Previous research has shown that the fibrillation of proteins in biologic drugs can render these drugs useless in the treatment of patients. Fibrillation occurs when proteins become misfolded and aggregate together. A variety of factors can cause fibril formation, such as agitation of protein solutions, increased temperatures in the surrounding environment, or simply a large timeframe between the time of drug manufacture and use. This study explores the possibility of staining protein aggregates with Nile Red and using fluorescence correlation spectroscopy (FCS) to monitor aggregate growth. FCS is very well suited as a technique for this type of investigation because the method is a single-molecule spectroscopic which can kinetically characterize the earliest stages of protein aggregation. Current results have shown it is possible to monitor the growth of insulin fibrils using this method. Future work will consist of refining this method and potentially expanding experimentation to other types of proteins.
Display: 75  
Project Title: *Alliaria petiolata and its Effects on Soil Microbial Communities in a Sandy Pine Forest in Central Illinois*  
Student Presenters: Alexander Faulkner, Truc-Quynh Nguyen  
Faculty Mentors: Dr. Kelly McConnaughay, Dr. Sherri Morris  
Department: Biology  
Graduate Project  

**Abstract:** This study evaluated the impacts of garlic mustard (*Alliaria petiolata*), an invasive species, on soil microbial community dynamics in a pine plantation on sandy soils in central Illinois. In situ soil CO2 efflux was significantly greater in invaded sites. Similarly, in vitro carbon mineralization was significantly greater for soils collected from invaded sites, but only early in the incubation period. Incubations with selective inhibitors showed a decrease in fungi relative to bacteria. Nitrogen-free selective agar plates inoculated with soil slurries supported greater numbers of bacterial colonies on invaded soils. Overall, our studies suggest that garlic mustard invasions have the potential to shift microbial community structure by selectively increasing some bacterial populations and decreasing fungal populations. Furthermore, garlic mustard invasions may significantly impact microbes involved in nitrogen turnover, suggesting that removal of this invasive species may not be sufficient to restore soil microbial community dynamics and ecosystem function.

Display: 76  
Project Title: *Comparison of the roles of the peroxidases YkuU, AbpC, OhrA and OhrB in Bacillus subtilis under oxidative stress*  
Student Presenter: Sarah Flury  
Faculty Mentor: Dr. Melinda Faulkner  
Department: Biology  
Undergraduate Project  

**Abstract:** Cells are exposed to peroxides through several sources including their surrounding environment as well as through their production as a byproduct of cellular metabolism. Peroxidases prevent the destruction of cells from peroxides; peroxidases degrade the peroxides into less harmful substances such as water or alcohol. Many species of bacteria have several peroxidases that function at different times, degrade different types of peroxides, or degrade peroxides in different ways. In *Bacillus subtilis*, there are nine peroxidases. In this study four will be focused on OhrA, OhrB, AbpC, and YkuU. The purpose of this study is to determine how the enzyme YkuU is utilized in relation to the other peroxidases produced by *B. subtilis* in the degradation of peroxides produced during either respiration or resulting from environmental exposure.
**Display: 78**

**Project Title:** *Antibiotic Activity of Highly Substituted delta-Lactones*

**Student Presenters:** Thea Hedemann, Josiah Jackson

**Faculty Mentor:** Dr. Brad Andersh

**Department:** Chemistry, Philosophy

**Undergraduate Project**

**Abstract:** Through an unexpected condensation reaction between beta-keto-esters and benzaldehydes, highly substituted 5-aryl-3-oxo-delta-lactones can be synthesized in a single-pot reaction. It has also been found that the resulting lactones exhibit antimicrobial activity. As a preliminary assessment of the antibiotic activity of these compounds, antibiotic susceptibility tests (minimum inhibitory concentrations (MIC)) were performed against *Bacillus subtilis*, a ubiquitous soil bacteria. The effect of varying substituents on both the lactone and benzene rings was investigated. From this work it was discovered that the introduction of hydrophobic substituents on the lactone ring and electron withdrawing hydrophobic substituents on the benzene ring enhance the activity of the compounds. Results from both the synthetic efforts and the antibiotic susceptibility testing against both Gram-positive and Gram-negative bacteria will be presented.

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**Project Title:** *Chemical Vapor Deposition of Molybdenum-Doped Titania Powders*

**Student Presenters:** Anna Johnson, Duncan Nall, Sam Sorkin, Nathaniel Townsend

**Faculty Mentors:** Dr. Edward Flint, Dr. Paul Wang, Dr. Jose Lozano, Dr. Kevin Kimberlin

**Department:** Chemistry

**Undergraduate Project**

**Abstract:** Titania (TiO2) powders doped with molybdenum were synthesized by chemical vapor deposition. Titanium tetraisopropoxide was entrained in a stream of nitrogen gas (70 standard cubic centimeters per minute) at 100°C and fed into a furnace at 470°C together with oxygen (50 sccm) and additional nitrogen (90 sccm). Powders were deposited on glass and silicon substrates. Varying amounts of molybdenum were added by entraining Mo(CO)6 into a 70 sccm stream of N2 at temperatures of 0, 10, 15, 20 and 25°C. The powders deposited were identified as anatase by X-Ray powder diffraction analysis. The elemental concentrations of Mo in the powders was determined by X-Ray photoelectron spectroscopy. Molybdenum concentrations varied from 1 to 10 mass percent as a function of the Mo(CO)6 entrainment temperature. Ultraviolet photoelectron spectroscopy and UV-Visible reflectance spectroscopy indicate that the band-gap of the TiO2 is lowered by the addition of molybdenum.
**Project Title:** Purification of delta-Lactones Synthesized Using Equilibrating Base Conditions  
**Student Presenters:** Craig Jones, April Balagna, Christy Joseph  
**Faculty Mentors:** Dr. Brad Andersh, Dr. Wayne Bosma  
**Department:** Chemistry  
**Undergraduate Project**

**Abstract:** A new method for delta-lactone synthesis has been discovered, offering a procedurally simpler method with greater atom economy and the use of greener reagents and solvents than conventional methods. This process is theorized to occur via gamma-alkylation, contrary to the conventional alpha-alkylation mechanism. The scope and limitations of this methodology were explored through substituent variation of beta-ketoester reagents and purification of products. Purification was assessed through proton NMR, after which purification percent yields were determined. It was observed that alpha-substituted delta-lactones were able to be purified by trituration in ethyl ether in yields of 65-75%, gamma-substituted delta-lactones could not be purified in high yield via trituration, so flash chromatography was used instead, resulting in 81-85% yield. However, alpha-substituted delta-lactones could not be purified using flash chromatography, and it was concluded that these two purification methods are mutually exclusive for this application. Alternatively, alteration of work-up procedures resulted in purification yields of 85-95% for the products of both alpha- and gamma-substituted delta-lactones. Work will soon begin on the synthesis of a compound containing both aromatic aldehyde and beta-ketoester reagent components in order to observe whether intermolecular variations of this methodology are possible.

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**Project Title:** Determining the role of YkuU as a peroxidase in Bacillus subtilis  
**Student Presenters:** Alyssa King, Nicole Broden  
**Faculty Mentor:** Dr. Melinda Faulkner  
**Department:** Biology  
**Undergraduate Project**

**Abstract:** Reactive oxygen species form in cells grown in aerobic conditions as a natural byproduct of cellular metabolism. Among these reactive oxygen species are peroxides, which damage cells by interacting with lipids and proteins, as well as the DNA of the cell. To protect against peroxide damage, cells contain peroxidases that break down peroxides into water and either their respective alcohols or molecular oxygen. Bacillus subtilis contains two primary peroxidases: catalase and alkylhydroperoxide reductase. However, there appears to be a third, uncharacterized peroxidase called YkuU. While alkylhydroperoxide reductase and catalase have been widely characterized, the function of YkuU is unknown. The objective of this research is to characterize the function of YkuU and the conditions under which its gene ykuU is expressed.
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Project Title: Problematic Alcohol Use in College Students: A Slippery Slope
Student Presenters: Melissa Kriauciunas, Rose Clapper, Jessica Maas
Faculty Mentor: Dr. Amy Bacon
Department: Psychology
Undergraduate Project

Abstract: Problematic alcohol use accompanied by illicit drug use is increasing within college populations (Bennett et al., 1999). To see if there was an upward trend in the consumption of tobacco, prescription drugs, and marijuana, as alcohol use increased, we examined the contention that college students with problematic alcohol use also have a greater likelihood of using other substances. Undergraduates (M=18.94, SD=1.52) were surveyed. Participants (N=184) were divided into three categories based on drinking behaviors as outlined by the Alcohol Use Disorders Identification Test (AUDIT; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001): non-drinkers (n = 28), non-problematic drinkers (n = 98) and problematic drinkers (n = 58). Those with an AUDIT sum of 10 or greater scored as problematic drinkers (DeMartini, 2009). Substance use was measured using the Nonmedical Prescription Drug Use (NPDU) scale (Richman et al, 1999). Results showed a significant difference between alcohol use groups for marijuana, (F (2, 168) = 10.49, p <.001, η² = .04) and tobacco (F (2, 167) = 10.94, p < .001, η² = .05). Post hoc tests indicated that problematic drinkers (tobacco: M= 2.70, SD= 2.00; marijuana: M= 2.23 SD= 1.67) reported significantly higher marijuana and tobacco use than non-problematic drinkers (tobacco: M= 1.52, SD= 1.49; marijuana: M= 1.40, SD= 1.04) and those who did not drink (tobacco: M= 1.24, SD= 1.20; marijuana: M= 1.08, SD= 0.41). No significant difference between groups in the use of painkillers existed. These results suggest we can better identify risk for using other substances based off drinking habits.

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Project Title: Quantifying fecal cortisol levels in the highly endangered red wolf (Canis rufus)
Student Presenter: Jade Metzler
Faculty Mentors: Dr. Barbara Frase, Dr. Craig Cady
Department: Biology
Undergraduate Project

Abstract: Stress levels in red wolves (Canis rufus) were measured by quantifying cortisol levels in feces. The mammalian stress response is regulated by the hypothalamus-pituitary-adrenal axis which results in the production of glucocorticoids, a class of steroid hormones such as cortisol, that are released from the adrenal cortex. Cortisol exists in three forms – bound, non-bound (free), and conjugated. The most common techniques used to measure glucocorticoids utilize invasive blood sampling, which can act as a stressor itself and cause an elevation in plasma glucocorticoids. A noninvasive technique to quantify cortisol levels has been developed using feces thereby eliminating the need to capture and introduce additional stress on the wolf. Although the release of cortisol is an adaptive response to stressors such as hunting and fighting, extended or chronic stress can lead to suppression of growth and reproduction, decreased immune response and increased healing time. Different stressors are likely to be experienced by wolves in the wild and wolves in captive breeding programs. In the initial analysis of wild wolves, all three forms of cortisol were statistically different from one another (one-way ANOVA, p=0.0150, n=16). A non-invasive measurement of total cortisol production will give a better understanding of overall stress dynamics and allow for more valid evaluation of...
stress without added human interaction. Red wolves are one of the world’s most endangered canids. Therefore it is vital to determine stress levels in red wolves to develop the best conservation plans.

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Project Title: Rethinking ‘Green’: Sustainable, Renewable, Functional Biocomposites
Student Presenters: Carl Meunier, Lena Moore, David Gray, Nathaniel Dexter, Erik Larson
Faculty Mentor: Dr. Luke Haverhals
Department: Chemistry
Undergraduate Project

Abstract: Economical methods to produce sustainable, renewable, and functional composite materials are of great interest for numerous and wide ranging applications. While synthetic polymers are commonly utilized, they are resource intensive to produce, often do not readily degrade (when necessary), and are often limited in functionality (both physical and chemical properties). Presently, many methods to produce bioplastics essentially involve digestion of biomass to synthesize monomers similar to those derived from petroleum. As such, these materials are often not as ‘green’ as assumed and suffer many of the functional limitations associated with synthetics. Additionally, in denaturing biopolymer structures, these processes do not take advantage of the ‘extra’ functionality that are characteristic of biomaterials (above and beyond what synthetics are capable of). Here, the production of functional composite materials directly from biomass is demonstrated utilizing ionic liquid solvents via a process coined: “natural fiber welding” (NFW). Ionic liquids (ILs) are defined as salts (i.e., composed of ions) that are liquids below 100 °C and may be tuned for many applications due to the large number of available ion combinations. Data are presented that show the development of processes to produce biocomposites of various mixtures of cotton, hemp, wood, and jute utilizing IL-based solvents. The composite samples generated were subjected to mechanical testing and exhibited properties that were as good as or better than traditional synthetic plastics (i.e., polyethylene). Other characterizations that will be discussed include microscopic imaging, infrared spectroscopy, and x-ray diffraction data that help understand composite materials and improve processing techniques.

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Project Title: Functional Assignment of Mitochondrial Carrier Proteins in Tetrahymena thermophila
Student Presenter: William Moser
Faculty Mentor: Dr. Nicholas Stover
Department: Biology
Undergraduate Project

Abstract: The genome of Tetrahymena thermophila contains 49 putative mitochondrial carrier family (MCF) genes, based on the initial automated annotation. These genes encode proteins containing MCF domains, which are transmembrane domains rich in six hydrophobic alpha helices, allowing transport of various molecules across organelle membranes, such as ATP, iron, and S-adenosylmethionine. However, the precise function of each of these Tetrahymena genes has not yet been determined. MCF proteins in a few model organisms, like yeast and Arabidopsis, have been extensively characterized. Classification of the Tetrahymena genes into subcategories was performed by sequence comparison with genes from these species. A cladogram was constructed using the MCF protein sequences in order to visualize the evolutionary relationships between
them. These relationships were further examined using BLASTP. The location of the MCF domain was determined for each protein using a Kyte-Doolittle plot, and the sequences were analyzed for potential targeting sequences. Expression levels of the MCF genes during various metabolic states was also investigated. These combined analyses have allowed us to propose functions for the 49 putative MCF genes in Tetrahymena.

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Project Title: AMP-activated protein kinase (AMPK) as a potential indicator of stress tolerance in invasive species: Sequencing the AMPK gene for a model invertebrate and fish species
Student Presenter: Marshall Moyer
Faculty Mentor: Dr. Jennifer Jost
Department: Biology
Undergraduate Project

Abstract: The goal of this research project was to sequence the AMP-activated protein kinase (AMPK) gene for Dreissena polymorpha, a model invasive invertebrate, and Ictalurus punctatus, a model native and commercially important fish species. AMPK was chosen as the cellular stress mechanism of focus due to its central role in energy regulation and because it is present in many organisms. This study is part of a larger project investigating the role of AMPK in the cellular stress response and comparing the physiological tolerances of native and invasive species. Thus far, DNA has been isolated from both zebra mussel and catfish and amplified using PCR with designed degenerate primers. Products of the expected base pair size have been identified using gel electrophoresis, eluted, purified, and sent in for sequencing. Once sequences are obtained, real time quantitative PCR and progressive temperature exposure will be employed to measure AMPK mRNA levels in heat stressed organisms. It is predicted that heat stressed organisms will show elevated levels of AMPK mRNA.

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Project Title: Increased Cellular Proliferation and Neurodifferentiation by Valproic Acid Delivered via Electrospun Poly-Caprolactone Nanofibers
Student Presenters: Ryan Niemeier, Elizabeth Podkawa, Erin Koch, Collin Innis, Kaysaw Tuy, Christopher Frank, Alexander Barry, Brandon Coates
Faculty Mentors: Dr. Kalyani Nair, Dr. Craig Cady
Department: Chemistry, Biochemistry
Undergraduate Project

Abstract: Introduction: A current challenge in biomaterials is the lack of effective drug and cell combinational delivery methods. Separate methods often lead to poor results in tissue regeneration and patient treatment. The use of a combinational material leads to more effective drug delivery and directed treatments. Objective: The use of valproic acid (VA) with electrospun poly-caprolactone (PCL) nanofibers produces materials that retain cytocompatibility and deliver VA to attached cells. We hypothesize that VA leads to enhanced cell proliferation and encourages neural transdifferentiation of human Wharton’s Jelly Stem Cells (hWJSCs). Methods: VA was added to PCL solution before electrospinning yielding a VA concentration of 20 mM. Electrospun material was seeded with hWJSCs and incubated for a time-dependent assessment of...
proliferation by MTS assay. Differentiation was examined by a conditioned media bio-assay. Chemical analysis of fibers with high performance liquid chromatography (HPLC) and x-ray diffraction (XRD) were used to determine the release of VA from PCL fibers. Results: MTS demonstrated enhanced cell proliferation at DIV 3 with significance level at 95%. Microscopy showed morphological characteristics of early neural lineage. HPLC showed a slow-rate release of VA that remained consistent. XRD results indicate high crystallinity within the fibers. Discussion: We have demonstrated that PCL produced with VA effectively delivers drug to cells on the material. The optimal amount of VA to be embedded with PCL is the subject of ongoing experiments. Finally, these results indicate that more specific neuro-growth factors can be used in combination for neuro-differentiation of hWJSCs.

Display: 87
Project Title: Hydrogenation and Hydrogenolysis of Chlorinated and Brominated Compounds: Which Compounds Homocouple and Which Compounds Hydrodehalogenate?
Student Presenter: Joshua Peterson
Faculty Mentors: Dr. Brad Andersh, Dr. Dean Campbell
Department: Chemistry
Undergraduate Project
Abstract: Synthesizing palladium nanoparticles within a polymer allows for a cleaner, safer, and more durable catalyst for organic reactions than metallic palladium. A palladium-infused polydimethylsiloxane catalyst has been used to catalyze hydrogenation and hydrogenolysis reactions. The objective of this research was to determine whether reductive homo-coupling, hydrodehalogenation, or no reaction occurred when various brominated or chlorinated hydrocarbon molecules were used as the starting materials for the reaction. Thus far, primary, and tertiary alkyl halides have shown no reaction. Bibenzyl secondary bromides undergo reductive homo-coupling while bibenzyl secondary chlorides hydrodehalogenate. Primary benzylic and aromatic chlorides and bromides also undergo hydrodehalogenation. Reactions with secondary alkyl halides as well as secondary benzylic halides still need to be performed. Once all of the substrates have been tested, experiments will be designed to investigate the mechanistic pathways for these reactions.

Display: 88
Project Title: Coliform Growth in Organic and Conventional Kale
Student Presenter: Emily Peterson
Faculty Mentor: Dr. Ted Fleming
Department: Dietetics
Undergraduate Project
Abstract: Organic foods are increasing in popularity worldwide, especially in the United States. For 2012, the United States Department of Agriculture’s Agricultural Marketing Center reported that over 100 countries have an estimated 25,000 certified organic farms, with 17,750 of them in the United States. Since the National Organic Program took into effect in 2002, organic farm operations increased 240%, as recorded in 2012. Consumer demand for safer foods has driven much of the growth in organic farm operations. This demand may be due to outbreaks of foodborne illness in foods that were grown or raised conventionally, leading consumers to believe that a more natural method of production (i.e. organic) will produce safer foods with
less microbial contamination. However, a major concern over the microbial safety of organic farming involves the replacement of synthetic fertilizer with raw animal manure for fertilizer. Coliform bacteria present in the raw manure can contaminate produce and thus may not yield safer foods. The literature is inconclusive with regard to this aspect of organic food safety. Therefore, this study evaluated the presence and frequency of coliform and other bacteria in a sampling of organic and conventional kale.

Display: 89
Project Title: The Influence of Traditional Chinese Values, Communism, and the West on Chinese Health Care
Student Presenters: Marissa Rettig, Athenia Wells
Faculty Mentor: Dr. Daniel Getz
Department: Biology, Religious Studies
Undergraduate Project

Abstract: With the rise of Modernity and the clash between China and the West, Chinese identity has been greatly altered. This change in the way that the Chinese see themselves can be reflected in the medical practices in China today. After China’s defeat in the Opium Wars during the nineteenth century and the signing of the Unequal Treaties, Chinese felt the need for a change in their society. This resulted in the end of thousands of years of Chinese dynasties and the eventual rise of the communist party. Chairman Mao Zedong called for reform with the destruction of traditional ideologies and customs. Mao’s reformation changed many aspects of China including healthcare, especially with the creation of the “barefoot doctors,” which were formed as an effort to provide health care for all. Again health care was changed when Deng Xiaoping later came into power and the free market was opened, which provided the possibility of using health care as consumer item. Although traditional Chinese values and communist values place a great emphasis on the community, China has been influenced by the West, which promotes individuality and personal gain. This has influenced the types of medical treatment used as well as the manner in which it is distributed. This project will explore how health care in China is associated with a conflicted sense of identity due to the competing claims of traditional Chinese values, the ideals of communism, and the ideals of the West.

Display: 90
Project Title: Characterization of Staphylococcus aureus Strains in Markin Recreational Center at Bradley University
Student Presenters: Mitchell Ryan, Jennifer Wiley
Faculty Mentor: Dr. Ted Fleming
Department: Health Science
Undergraduate Project

Abstract: Staphylococcus aureus (S. aureus) is a bacterium that is resident upon many healthy humans. It is a common cause of skin infection, pneumonia, and surgical/blood infections. One antibiotic-resistant strain of this bacterium, MRSA (methicillin-resistant S. aureus), is commonly found in certain settings including hospitals and athletic facilities such as weight rooms, wrestling mats, and training rooms. This study sought to determine the prevalence of S. aureus at the Markin Recreational Center at Bradley University. Fourteen presumptive isolates were obtained, identified to the species level, and screened to determine whether isolates were MRSA. Several disinfecting agents, including Oxivir Tb RTU, the agent used at the Markin Center, were
applied against the S. aureus isolates to determine the effectiveness of these agents with regard to their ability to reduce Staphylococcal contamination. It was hypothesized that Oxivir Tb RTU would be the most effective disinfectant of S. aureus bacteria.

**Display: 91**

**Project Title:** Decomposition of mixed hardwood leaf litter in the presence of soil treated with Alliaria petiolata

**Student Presenter:** Deepak Sabharwal

**Faculty Mentors:** Dr. Sherri Morris, Dr. Kelly McConnaughay

**Department:** Biology

**Undergraduate Project**

**Abstract:** Alliaria petiolata (garlic mustard) has been shown to modify soil community structure in areas in which it has invaded. These changes could potentially affect the decomposition of the litter of the various native hardwood species. Mesh litterbags filled with mixed-species hardwood litter were used to examine the effect of soils treated with garlic mustard on decomposition. Bags were placed in plastic bins in a controlled setting to isolate the interaction between soil treatment and decomposition. Litterbags were placed in one of two sets of bins: garlic mustard treated soil (GMS) and non-garlic mustard treated soil (NGMS) and were part of one of three collection dates: 1 month, 2 months, or 4 months. Litter placed on soil from garlic mustard sites decomposed more quickly than litter placed on soil from sites without garlic mustard. These data suggest that garlic mustard may increase decomposition rates and nutrient return to soils. This will have consequences for both aboveground and belowground biodiversity.

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**Display: 92**

**Project Title:** Infrared Spectroscopic Analysis of Small Molecule Adsorption onto Silica Thin Films

**Student Presenter:** Nicole Smiddy

**Faculty Mentor:** Dr. Edward Remsen

**Department:** Chemistry

**Undergraduate Project**

**Abstract:** The study of adsorptive interactions at the surface of silica nanoparticles is of great interest for many current and future applications in nanotechnology and medicine. In previous work, attenuated total reflectance Fourier transform infrared (ATR/FT-IR) spectroscopy used in conjunction with a flow through, small volume, liquid sample cell has enabled the analysis of adsorption of small molecules onto porous metal oxide thin films. However, the technique presents challenges in studying silica films because silica particles do not adhere effectively to most internal reflection elements (IREs), like diamond. We have determined that using either a ceria or titania adhesive layer stabilizes a silica film so that IR absorption spectra can be collected and Langmuir isotherms can be formed for adsorbed molecules on the silica film. This technique is demonstrated with a representative group of quaternary ammonium compounds that adsorb to silica. These compounds display distinct differences in their adsorption behavior on silica as evidenced by both their IR spectra and Langmuir adsorption constants. Further studies are in progress to evaluate the generality of this method, to characterize the morphology of silica-on-ceria film layers using scanning electron microscopy (SEM), and to construct molecular models of the molecule-film interactions.
Project Title: The effects of environmental stress on channel catfish: Detection of cellular stress proteins during high temperature and hypoxic stress  
Student Presenter: Emily Soltis, Sarah Keshwani  
Faculty Mentor: Dr. Jennifer Jost  
Department: Biology  
Undergraduate Project  

Abstract: Invasive species pose a threat to a multitude of habitats. In general, invasive species are introduced to a new habitat, thrive, and negatively alter the ecosystem. It is often assumed that invasive species are more environmentally robust than their native counterparts. However, there is little evidence to support this assumption, especially on a cellular level. Our research aims to understand the stress physiology of the native channel catfish, Ictalurus punctatus, and to compare it to the invasive Asian carp species in the Illinois River. In order to investigate stress physiology, we focused on two biologically relevant stressors, water temperature and hypoxia. More specifically, we exposed channel catfish to either high water temperature, hypoxic water, or a combination of both high temperature and hypoxia. Using isolated liver tissue, we measured heat shock protein 70 (HSP) levels as an indicator of cellular heat stress and protein denaturation, phosphorylated AMP-activated protein kinase (AMPK) levels as an indicator of sublethal cellular stress and energy reserves, and lactate accumulation as an indicator of anaerobiosis. Catfish exposed to both heat/hypoxia had a significant increase in lactate concentration after 1 hour and 100% mortality after 2 hours. Catfish exposed to hypoxia experienced a significant increase in AMPK activity while animals exposed to heat lacked a significant increase in any of the cellular markers. These results suggest that a combination of heat and hypoxia is a lethal stress event, hypoxia alone represents a sublethal stress, and heat alone does not elicit a stress response.

Project Title: The investigation of the relationship between emersion and varying lengths of exposure, recovery water temperatures, and air temperatures in Dreissena polymorpha.  
Student Presenter: Chloe Vezinaw  
Faculty Mentor: Dr. Jennifer Jost  
Department: Biology  
Undergraduate Project  

Abstract: Dreissena polymorpha, more commonly known as the zebra mussel, is an invasive species to freshwater ecosystems. This species has resulted in billions of dollars in damage repair to industrial companies and damaged habitats. It is known that many zebra mussels are exposed to aerial conditions if the substrate to which they are attached leaves the water (i.e. boat is trailered) or are naturally exposed to air when water levels change and that the mussels are able to survive these emersed conditions. Thus, zebra mussels are continuing to spread, especially as people unknowingly distribute them during boat transportation. The response of zebra mussels to emersion has not been well studied, especially with respect to the cellular events that occur during this stress. Previous work on this species has suggested that AMP-activated protein kinase (AMPK) can serve as an indicator of sublethal metabolic stress and that heat shock protein (HSP) levels are a strong indicator of severe stress and protein denaturation. This study measured AMPK activity and HSP levels during emersion and correlated these stress proteins to changes in mussel wet mass, dry shell mass, dry tissue mass, and shell dimensions (length, width and height) with the aim of investigating the relationship between
emersion and varying lengths of exposure, recovery water temperature, and air temperatures on Dreissena polymorpha. Mortality was found to increase with increasing length of emersion, air temperature, and recovery water temperature. This information may assist in decreasing the spread of zebra mussels and to further the understanding of their physiology.

Display: 95
Project Title: The cosmology and traditional Chinese medicine
Student Presenters: Athenia Wells, Marissa Rettig
Faculty Mentor: Dr. Daniel Getz
Department: Biology
Undergraduate Project

Abstract: The root of Chinese medicine is found within three conceptual systems of Chinese philosophy: yin and yang, the five elements, and qi. These three fundamental beliefs form the basis of both Chinese cosmology and medicine. Chinese cosmology is a way of explaining the universe and its connection to nature through these three foundational concepts. This cosmology sees the universe as a series of interconnected systems constituted of the elements that in turn are related to the qi that makes up the body and determines its health. Thus, through cosmology Chinese civilization has developed a way of diagnosing and treating ailments of the body. This project will explore how these philosophical building blocks of Chinese cosmology are the basis of understanding how the human body functions, the causes of illness, the treatments through which health is restored, and the medicines necessary to remedy illness.

Display: 96
Project Title: Hydrogenation of p-Nitrophenol Catalyzed by Polydimethylsiloxane-Encapsulated Palladium
Student Presenters: John Ziegenhorn, Alice Rockwell
Faculty Mentor: Dr. Dean Campbell
Department: Chemistry
Undergraduate Project

Abstract: Metal nanoparticles have been studied extensively in recent years due to their interesting electronic, optical and chemical properties. Many metal nanoparticles have exhibited the ability to catalyze various chemical reactions. In this study, palladium (Pd) nanoparticles encapsulated in a polymeric support, polydimethylsiloxane (PDMS), were tested for their ability to catalyze the hydrogenation of aqueous p-nitrophenol to p-aminophenol in both basic and acidic conditions. For these reactions, the catalyst pieces were stirred in p-nitrophenol solutions while hydrogen gas was supplied from a latex balloon. Since p-nitrophenol is yellow in basic conditions, its aqueous concentration was measured by visible light spectroscopy. In acidic conditions, p-nitrophenol is colorless, so the solutions were made basic by adding NaOH solution just before the spectroscopic measurements. Both acidic and basic solutions decolorized under the reaction conditions, indicating that the p-nitrophenol had been hydrogenated. Kinetic analysis of the hydrogenation of p-nitrophenol in basic conditions indicates that the hydrogenation reaction is a first-order process.
“Organizational Culture Analysis of a Supported Living Facility”

Alyssa Roehrig
Faculty Mentor Dr. Elena Gabor

Pictured with Provost Glassman
**Project Title:** Insufficiency of the (Linguistically) Finite  
**Student Presenter:** Leah Abel  
**Faculty Mentors:** Dr. Kevin Swafford, Dr. Kevin Stein  
**Department:** English  
**Graduate Project**

**Abstract:** “Insufficiency of the (Linguistically) Finite,” presented by Leah Abel under the supervision of Dr. Kevin Swafford in the Graduate English program, examines the process of translating poetry from English into Russian, beginning with Sufficiency of the Actual, a book-length collection of poetry by Illinois Poet Laureate Dr. Kevin Stein, Caterpillar Professor of English and Coordinator of Bradley’s creative writing program. Stein—recipient of four Illinois Arts Council Literary Awards and the National Endowment for the Arts Poetry Fellowship—published Sufficiency of the Actual in 2009. In what might evolve into a long-term collaboration towards a complete translation of Stein’s oeuvre, this project already displays both the beauty and difficulty of transforming the creative literature of one language into a faithful but equally artful translation in another. Passages such as “a creature the smarty pants party drunks called ‘Frank-and-Stein’” (from the title poem) and “a, our indefinite article’s shrewd way” (from “Lovesong Ending with ( )”) pose complexities, as word play and rhyming in most source languages lose their phonetic impact in translation, and Russian does not use an article system like English; additionally, references to “The Price Is Right,” Applebee’s, and Wiffle balls demonstrate the particularly American nature of Stein’s writing and represent a cultural challenge in translation. As a testament to his mission of bringing people from all walks of life to love poetry, Stein has now given his blessing for his work to be translated—for the benefit of international readers.

**Display:** 97

**Project Title:** Chewzie  
**Student Presenters:** Gregor Armstrong, Xavier Gordon, Tony Opp, Anson Goode, Connor Eck  
**Faculty Mentor:** Dr. Monica McGill  
**Department:** Interactive Media  
**Undergraduate Project**

**Abstract:** Chewzie is one of four minigames within Dapper. It was designed to teach players about the optimal ratio of food types within meals for diabetic players. Since Dapper focuses on many serious aspects of managing diabetes, Chewzie helps both reinforced learned information and to create a fun experience for those with Type II Diabetes. Chewzie players win points by collecting food in the appropriate ratio. For diabetic patients, the recommended proportion of food for a meal is two parts non-starchy vegetable to one part protein to one part starch or grain, with a little bit of fruit and dairy on the side. At the end of the game, the player’s pet gobbles up all of the food the player has collected, and the player is scored based on how closely they matched their ratio. When played repeatedly due to its enjoyable experience, patients should be able to easily remember what proportions they should use in their meals. The game also subconsciously builds associations with different types of food; for example, because junk food has a severe negative impact on score, we hope to dissuade it from being consumed in reality, while healthy foods like whole grains bring great gains to the player’s score.
**Display: 101**  
**Project Title:** The Interruption System: The Game  
**Student Presenter:** Aaron Beaty  
**Faculty Mentor:** Dr. Monica McGill  
**Department:** Interactive Media  
**Undergraduate Project**

**Abstract:** The Interruption System is a game for the iOS based off the album with the same title from the band Adam Kills Eve. I first discovered Adam Kills Eve back in 2008 and since then, have followed them religiously and loved their music. I contacted them after the release of The Interruption System and noted that I was very excited about it and wondered if they would want me to design a game based off the album. They were excited to have me do so and from there, I began the process of researching their music more in depth as well as what goes into iOS development. The Interruption System has been fully implemented after researching different aspects of space shooters as well as incorporating how to use the iOS device more interactively in the game. My first goal of this game was to contact the band and ensure that I had the necessary copyrights in order to effectively use their music. Next, I focused on development and implementation of assets into the game and working with Unity to figure out how to properly design an iOS game. This involved researching the JavaScript programming language more so that I could utilize new techniques that I’ve never tried. Lastly, I had to dive deeper into how the iPhone/iPod touch works with the accelerometer so I could analyze how players would move the player in the game. The Interruption System follows the story of Mr. Hopelessly In Love and his desperate attempt to save himself and the world from Ms. Destruction. In this captivating iOS game, players will experience space combat as well as the difficulty of having to collect air tanks in order to stay alive throughout the game.

**Display: 102**  
**Project Title:** Sonata-Allegro Formal Strategies in Mozart String Quartets  
**Student Presenters:** Clara Capriotti, Julie Haring, Seth Johnson, Evan Leong, Angela Paulick, Kathryn Spenn, Evan van Breemen, Jennifer Walker, Mikaela Wilmoth  
**Faculty Mentor:** Dr. John Orfe  
**Department:** Music Performance  
**Undergraduate Project**

**Abstract:** Sonata-allegro form (also called “sonata form”) is one of the great archetypes of formal organization in musical works of the Classic Era. The MUS 262: Music Theory IV course has examined how sonata form operates in the first movement of string quartets by Wolfgang Amadeus Mozart (1756-1791), specifically as regards the relationship of thematic areas with large-scale harmonic design. Each student in MUS 262 has individually analyzed the first movement of a mature string quartet by Mozart, for a total of nine. Each sonata-allegro movement consists of three large sections within a large binary division of two reprises: the Exposition followed by the Development and Recapitulation. The Exposition and Recap each divide into Primary and Secondary Thematic Areas, and the key of every thematic area has an important and specific relation to the tonality of the movement. Depending on the major or minor key of the quartet, certain tonal strategies can be expected, fulfilled and/or thwarted. Mozart’s elastic handling of sonata form creates solutions for tonal coherence across many minutes of music and satisfies aural needs for both
repetition and variation. Each student in MUS 262 explains the diverse and unique features of his or her chosen quartet and relates them to the universal organizing principles of sonata-allegro form.

Display: 103
Project Title: Variations on a Theme by Anton Diabelli, Past and Present
Student Presenters: Natasha Coan, Rebecca Crank, Tracey Furling, Laura Jorgenson, Patrick McGehee, Annalise Pittenger, Austin Wilson
Faculty Mentor: Dr. John Orfe
Department: Music Education
Undergraduate Project
Abstract: In February 2014, the students of the MUS 319: Music Composition class were asked to write individual variations for solo piano on a 32-measure waltz from early 19th-century Europe. First, the class examined melodic, harmonic, rhythmic, dynamic, and proportional features of the waltz. Next, each person uniquely applied techniques of melodic and harmonic development in their individual variation. Finally, the class examined the historical significance of the primary source. The waltz is by Viennese composer and music publisher Anton Diabelli, who in 1819 invited fifty professional composers then working in Germany to write a single variation as part of a nationalistic endeavor celebrating “Great Composers of the Fatherland.” Ludwig van Beethoven happened to be one of the composers Diabelli invited to participate in the project, but he took offense to being grouped among so many lesser peers. Beethoven decided therefore to write his own complete set of thirty-three variations on Diabelli’s “cobbler’s patch,” and in 1823 completed his Diabelli Variations, Op. 120, which many critics consider his most creative work. In 1824 Diabelli published Beethoven’s set as volume one of his project, with volume two comprising the forty-six composers who contributed individual variations. For the MUS 319 class, the Diabelli Variation Project not only provided a vehicle to realize compositional techniques discussed in class, but also created a dialogue with a historically significant project that served to bring about one of the defining masterworks of Western Classical music.

Display: 104
Project Title: How Social Media affects the Olympics
Student Presenters: Tyler Dalsin, Brie Karls, Christopher Morgan
Faculty Mentor: Dr. Ji Young Kim
Department: Sports Communication
Undergraduate Project
Abstract: Our group is evaluating the effect of social media on the 2014 Winter Olympics in Sochi, Russia by doing a content analysis. We followed specific athletes using different forms of social media like Facebook, Twitter and Instagram during February 7, 2014 to February 23, 2014. All of the athletes we followed were athletes from the United States and they partook in different events such as Speed Skating, Figure Skating, Men’s Ice Hockey, Curling, Snowboarding, and Skiing. All three of our group members followed everything that each athlete posted during the duration of the 2014 Winter Games. With the advancements of social media it is important to see the effect it has on the athletes, the public and the Olympics as a whole. There are specific rules that the International Olympic Committee has for social media use and all of the athletes need...
to follow this in order to participate. We want to observe the affects social media has on big events so we will be comparing the findings from our research with the findings of studies on social media use in past Olympic games like Beijing and Vancouver.

**Display: 105**

**Project Title:** *The Digital Humanities, Project Gutenberg, and Retrograde Progress*

**Student Presenter:** Lisa Dooley

**Faculty Mentor:** Dr. Susan Brill de Ramirez

**Department:** English

**Graduate Project**

**Abstract:** Contemporary technology is moving humanities research forward in remarkable and innovative directions, but insofar as select arenas are concerned, the progress is problematically biased. For centuries Native Americans have been marginalized, their cultural, economic, and literary contributions discounted. The historical disenfranchisement of this ethnic group continues today. Though the Native American authored literary cannon is rich and diverse, it is relatively inaccessible in digital format. This has significant implications for literary critical data mining purposes. The field of digital humanities has introduced yet another layer of oppression to the Native American narrative. My project is based on a textual analysis of Native American authored texts offered through Project Gutenberg’s digital archive. Though there are over 45,000 digitized works available through Project Gutenberg, only 128 are listed under “Native Americans.” Of these 128 texts, only eight are Native written. Through a variety of data gathering techniques, I will perform a textual analysis of these available works while evaluating them from a critical literary standpoint. I am also interested in juxtaposing these available texts with other canonical Native American authored texts, including more recently written works by authors such as Sherman Alexie and Leslie Marmon Silko.

**Display: 106**

**Project Title:** *Dapper - Lucky Landing*

**Student Presenters:** Connor Eck, Aaron Beaty, Anson Goode, Anthony Opp, Connor Eck

**Faculty Mentor:** Dr. Monica McGill

**Department:** Interactive Media

**Undergraduate Project**

**Abstract:** Lucky Landing is a mini-game within the game Dapper, a game designed to improve outcomes of patients with Type II Diabetes. While the core gameplay of Dapper focuses more on the daily activities related to learning how to care for the disease, this mini-game is strictly for fun. People with Type II Diabetes often struggle with depression, and Lucky Landing has been designed as a bright, happy game to elevate the mood of players. Lucky Landing has been fully implemented after engaging in four key research activities. First, we researched the types of games that have been successful with this demographic, adults aged 30-50 years old. Second, we researched the positive aspects of puzzle games and the challenges that they present to an audience. Third, we researched several software algorithms for developing the matching scheme for the match gameplay mechanic that we chose. After studying the various aspects necessary to create a successful game, we were able to design and develop the player experience. Finally, we conducted full-scale user and functionality testing to identify and correct problems with the game design and implementation. In the game,
the player’s character is placed at the top of a stack of books in a library. In order for the player to succeed, they must select blocks that connect with matching blocks so that the blocks are destroyed. Eventually the player’s character falls to the bottom of the screen allowing them to win. As the game progresses, levels become more difficult causing the player to have to choose which blocks they destroy more carefully.

Display: 114
Project Title: Perception on Cultural Differences
Student Presenters: Christine Gale, Connie Martinez, Talia Crackel, Andrew Lesniak
Faculty Mentor: Dr. Ji Young Kim
Department: Advertising
Undergraduate Project

Abstract: This study examines the difference between Eastern and Western cultural opinion on the Olympics. The goal of the research is to show and demonstrate to others the effect of cultures on expression and opinions on the Olympics, including the meaning of the Olympics, expressions during it, and the professional values of athletic training. For this study, we will conduct a focus group interview with a sample of 20 people of Eastern and Western cultural influences. We will show the participants videos of Olympic training from an Eastern cultured country (China) and a Western cultured country (United States). We will also show newspaper articles pertaining to Olympic success and failure from both countries. After we have shown all materials, we will ask the participants questions about media attention of the Olympics on these cultures and how they may affect their self-perception. At this time, the study is still in process and results will be posted after interviews are conducted. We believe that our results will show a difference between Eastern and Western cultured people on the perception of the Olympics.

Display: 107
Project Title: Aura
Student Presenter: Anson Goode Jr
Faculty Mentor: Dr. Monica McGill
Department: Game Design
Undergraduate Project

Abstract: Aura is a side-scrolling platform adventure game that takes the hardships of intimate relationships and transforms them into a playable experience that is designed to be fun as well as conveying deeper meaning. Aura is meant to be dark and emotionally impactful, but wrapped in a platformer package designed to be fun. Aura was designed as a result of key groups of research. I researched the demographic, young adults ages 18-30, to discover what game genres appeal to them. Next I had to research the common themes of self-afflicted relationship problems. I then researched ways to visualize these common motifs so they could become game environments. The inspiration came from my own real world experience with problems in relationships, conversations with peers about their experiences with problems in relationships, and the mental hardships one must conquer to repair them. You play Khail, a silhouetted humanoid confronting his girlfriend Amor, realizing that there are problems with their relationship and setting out on a journey into the metaphorical world of his own mind to conquer his inner demons. The player will play through 3 levels of
platforming, with perilous jumps, weight related puzzles, moveable blocks, and locked doors, eventually combating all within himself that makes a relationship difficult, allowing him to rekindle this relationship with Amor. Reaching its Alpha state, the game will be tested by the targeted demographic for user experience, fun, and theme. The game will again be beta tested for bugs and cohesiveness. Aura will release May 2nd.

Display: 108
Project Title: Super Shopper: A Dapper Experience
Student Presenters: Dylan Jacobs, Joseph Ruel, Jack Stephens, Connor Eck, Anson Goode, Tony Opp
Faculty Mentor: Dr. Monica McGill
Department: Interactive Media
Undergraduate Project

Abstract: Super Shopper is a serious mini-game that conveys a healthy diet through its core mechanics. The game itself is a part of Dapper, a serious social game to improve the outcomes of patients with Type II diabetes. Super Shopper is part of the “Store” scene, to tie it into. When the player begins Super Shopper, they are assigned a random shopping list that corresponds to specific recipes. The player must then find all of the required items within a given time. For each type of food, there are healthy and unhealthy options, and the player gets more points for picking the healthier ones. Once all of the items have been obtained, or the time runs out, the player enters a second part of the game where the food items need to be organized in their shopping bag by order of their weight, so they don’t crush anything under themselves. We arrived at the concept for Super Shopper because healthy food has a very direct correlation to diabetes care. We researched the various types of healthy foods that are best for diabetic patients, focusing on healthy and tasty food substitutes for common foods used in non-diabetic diets. We then researched various gameplay mechanics that were interesting, but also related to food. Not only does this game make diabetic patients aware of healthy food substitutes to help them maintain their blood sugar levels, it is also meant to encourage behaviors in making these choices.

Display: 109
Project Title: Sonnets in the 21st Century
Student Presenter: Darlene Jacobs
Faculty Mentor: Dr. Martha Craig
Department: English
Undergraduate Project

Abstract: "Sonnets in the 21st Century" combines research with creative writing. I began by writing eight sonnets in the Shakespearean style and then incorporated them into a fictional piece in which the main character receives the sonnets from a former lover. My research revealed the literary and cultural characteristics of the Shakespearean (or English) sonnet, particularly the form, rhyme scheme, language use, subject, and use of literary devices such as metaphor. The fiction portion of my project is written in journal form and relates in first-person narrative the experiences and reactions of the main character to the sonnets and to the former lover who sent them. The accompanying paper explains what I found in my research and how I used that research to write the poems and the story. This project was completed for ENG 347 Shakespeare in Fall 2013. It is an entertaining and enjoyable story, illustrating a hypothetical situation that
answers the questions “What would it be like to have sonnets written for oneself today in the 21st century? Could this literary form be at all relevant to people today? Could it still express what Shakespeare expressed, including self-criticism, despair, and the triumph of love?”

Display: 110
Project Title: Midstate Magazine
Student Presenter: Stephanie Robbons
Faculty Mentor: Dr. Robert Jacobs
Department: Television Arts
Undergraduate Project
Abstract: Midstate Magazine is a student produced, professional television show. We air once a week in the Peoria area and are expanding to East Peoria, Creve Courer, Washington, & more. The whole show is produced by students of many majors in many positions from talent, to director, to audio and many more. The top of the line equipment in the Hench Production studio showcase a real world experience in all aspects.

Display: 111
Project Title: Organizational Culture Analysis of a Supported Living Facility
Student Presenter: Alyssa Roehrig
Faculty Mentor: Dr. Elena Gabor
Department: Organizational Communications
Undergraduate Project
Abstract: Themes of historical reliance, family orientation, and a great importance placed on keeping residents active were revealed in a diagnostic study of a young supported living facility in a medium-sized, Midwestern city. Qualitative and quantitative research methods were used to conduct the cultural analysis. All analysis was based on interviews with employees, ten hours of field observation, a communication audit, and textual analysis of the company website and organizational documents. The research study focuses on a unique mix of constructive and dysfunctional processes that characterize the supported living facility. The organizational mission emphasizes positivity, but overall, organizational members are not concerned with the collective outcome of their actions. Members do only what they are told and lack initiative, flexibility, and timely decision making. As a result, the culture of this organization can be characterized as dependent (McAleese, Hargie & Tourish, 2009). A diagnosis of organizational communication problems was achieved through the study of the long-term memories held by residents and staff and the values displayed by the employees. The solutions created for the organizational problems as well as the research done on an organization that emulates positivity can help contribute to further research that has a focus on positive workplace environment.
Display: 112
Project Title: Organizational Culture of an Insurance Company
Student Presenter: Kelsey Stagen
Faculty Mentor: Dr. Elena Gabor
Department: Organizational Communications
Undergraduate Project

Abstract: The purpose of this research study was to conduct a cultural analysis of a mid-sized insurance company. I was able to gain access into the organization in order to identify the different traits and aspects of culture. Over the course of three months, I utilized various qualitative methods to gather this information. My findings were concluded through a textual analysis of the company website and other organizational documents, five semi-structured interviews, and 26 hours of field observation. I also distributed an organization culture survey to inquiring about the following six dimensions: teamwork, morale, information flow, involvement, supervision, and meetings. Through these efforts, I was able to identify common themes and conclude that the organization had a constructive culture (Hargie & Tourish, 2009). Organizations with this type of culture focus on the employees by recognizing them for their hard work and making them feel valued. It was also concluded that there was a very family-oriented and relationship centered atmosphere that also respects the work-life balance philosophy. As I listened, watched, and learned about some of the areas in which the company could improve upon, I compiled a set of recommendations for the executive board to review.