

FLASHTALK:1

First Annual Faculty Research Flash Talks
College of Applied Sciences and Arts
Southern Illinois University

Friday, April 28, 2017
6:00 pm- 8:00 pm
Carbondale Community Arts
304 West Walnut Street

CASA

Abstract Booklet

Andy Wang | Dean | College of Applied Sciences and Arts
Chad Schwartz | Research Committee Co-Chair
Karen Jo Johnson | Research Committee Co-Chair

Presentation Abstracts

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THE INCLUSION OF AFRICAN AMERICANS INTO ARCHITECTURE AND OTHER PROFESSIONS

Michael D. Brazley, Ph.D., AIA, NCARB, NOMA

Associate Professor, Architecture

This study investigates the inclusion of African Americans into the profession of architecture. This research also seeks to help reduce the gender gap between men and women in architecture and other professions. African American inclusion has to be purposeful, while dismantling the practice of 'white privilege.' How would a university or college go about encouraging inclusion? How can the university be an inspiring and welcoming environment for African American students and professors? The outcome of this research includes a better understanding of inclusion of African American students and professors; scholarships and recruitment; community outreach programs, and making this knowledge generalizable.

AVIATION FLIGHT DATA ANALYTICS

Ken Bro

Assistant Instructor, Aviation Management and Flight

The Department of Aviation Management and Flight currently uses 5 Cessna 172R G1000 aircraft for intermediate flight training. These aircraft log 64 flight data variables at a 1hz sample rate; with 5 aircraft running for 5 years there are over 2 billion discrete data points. This data has been used to analyze different flight safety characteristics including loss of control, hard landings, and abnormal maneuvers.

The use of machine learning with time-series data for predictive analytics is currently being researched. Loss of control events stemming from unstabilized approaches are currently the leading cause of fatal accidents in our region. Using neural networks to discover relationships between different flight variables on approach shows promise towards predicting approach quality and may help avoid loss of control events.

CASA CENTER FOR THE INTERNET OF EVERYTHING (C4IOE)

Sam Chung, Ph.D.

Professor/Director, Information Systems and Applied Technologies

The purpose of this presentation is to share an idea of a virtual Center for the Internet of Everything (C4IoE) that will promote the awareness, training, education, and research of the Internet of Everything (IoE) through multi-disciplinary research and creative activities. The advent of the Internet allowed

computers to talk to each other. With cheaper hardware components and network infrastructure, the Internet of Things (IoT) emerged to allow embedded devices to talk each other. Based upon the IoT, the IoE will come to allow everything to talk to each other by interconnecting people, processes, things, and data. CASA needs to prepare for the next generation workforce which is aware of the emerging technology trend (IoE) and can transform their legacy business domains to IoE-enabled ones. For this purpose, the Center has conducted two research projects and will also launch two new projects: 1) ProDevOps = Programming + Development + Operations, 2) Digital Humanities in American Pragmatism Research, 3) Visual Sustainability Development for SIU Image Promotion and Advertisement, and 4) A Scalable and Agile Web Application using Search Engine Marketing for SIU Online Degree Programs. We will share our preliminary results of our research projects and two new project proposals with CASA researchers, who may be interested in applying the IoE to their business domain for a joint research project with the Center. In the future, the Center can create more joint research projects to transform the current systems to smart and secure ones equipped with the IoE.

THE OPERATIONALIZING OF LYNCH'S COGNITIVE REPRESENTATION ELEMENTS OF LARGE SCALE ENVIRONMENTS

Jon Davey, Ph.D.

Professor, Architecture and Interior Design

Throughout the millennia, starting with the work of Vitruvius, "The Ten Books of Architecture," Andrea Palladio, "The Four Books of Architecture," to the work of Kevin Lynch with his powerful wayfinding treatise, "The Image of the City," architects have strived to codify the built environment. Architecture within the built environment is a powerful modifier of human behavior and physiology. Because of the very ubiquitous nature of architecture we find ourselves continually in spaces that we or someone else has designed. The study of the human organism in relationship to architecture is of critical importance.

The cross-discipline research of architecture and neuroscience has been around for some three hundred years. In the 17th Century, the English physician Thomas Willis became the father of neurology (Finger, 1994). Willis was part of the Oxford Circle, a cadre of intellectuals of various and diverse backgrounds studying physiology. They were also the first to introduce the idea of the word neurology to the medical lexicon. Of interest architecturally is Sir Christopher Wren, the designer of St. Paul's Cathedral of London, also a part of the group. Because he was an architect, his particular skills in draughtmanship (drawings) were used in sketching out various organs such as the brain. In 1664, Thomas Willis published one of the most important books in the history of brain sciences, his "Cerebral Anatome" (Finger, 1994).

"Portraits of the Mind Visualizing the Brain from Antiquity to the 21st Century," by Carl Schoonover (2011), is a remarkable new text dealing with how one looks at

the brain from Caja to fMRI, especially the new sophisticated technologies that have occurred in the last 10 to 15 years. Maister-Hoffman (p. 1-2, 2012) states, "Scientific advancements in cognitive science and brain imaging are impacting numerous disciplines and our overall understanding of how the brain learns and creates memories of the spaces we inhabit. Despite the fact that this research is in its infancy, it has already begun to reveal something about the cognitive nature of spatial learning and processing." Whitwam (para. 2, 2014) states, "Wherever you happen to be sitting or standing right now, you only know where that place is because of the place and grid cells in your brain. The discovery of these cells and the way they interact to help us understand the world just earned a group of scientists the 2014 Nobel Prize in Physiology or Medicine."

Cognitive neuroscience uses numerous methods, including behavioral tests and brain imaging techniques, to investigate the structure and organization of the brain that support different cognitive functions. Cognitive neuroscience can help explore how wayfinding via cognitive representations of large-scale environments is realized in the brain: what are the mental processes and cognitive functions that support wayfinding activities; and how are cognitive representations realized in terms of connectivity and interactions between neural circuits. With this in view, cognitive neuroscience research can offer insights to support the development of a theory of wayfinding, as well as an understanding of how the brain constructs cognitive representations of large-scale environments. Knox and Pinch (2009) state, "It is clear, though, that people do not have a single image or mental map that can be consulted or recalled at will. Rather, we appear to possess a series of latent images that are unconsciously operationalized in response to specific behavioral tasks. The seminal work in this field was Kevin Lynch's book "The Image of the City," published in 1960 and based on the results of ... From an examination of the resultant data, Lynch found that people apparently structure their mental image of the city in terms of five different kinds of elements: edges, pathways, landmarks, nodes and districts." The initial research would have a cross-discipline team including architects, urban planners, radiologists, neuroscientists, and can involve industry connections (CASA Strategic Plan Action 10). Action four in the CASA Strategic plan is to potentially establish Urban Planning in the School of Architecture (SOA). This grant and its proposed research areas would provide further evidence that Southern Illinois University has an interest in urban design; both urban and rural to sustain a discipline in this area.

THREE RESEARCH PROJECTS IN MORTUARY SCIENCE

Anthony Fleege

Associate Professor, Mortuary Science and Funeral Services

I am currently working on several research projects. The first project that I am finishing up and submitting for publication is the dangers of radiation seeds as they relate to cremation. Should they be removed before cremation and, if not, what dangers do they present to the crematory operator.

The second project, in its infancy stage, is the review of 100 funeral home General Price Lists to compare and contrast prices. My goal is to see if funeral homes are “nickel and diming the public.” What exactly are funeral homes charging for in different states and how do overall prices compare in different markets.

The last project of research is whether or not there have been lawsuits associated with ADA (Americans with Disabilities Act) filed against funeral homes. The ADA protects those with disabilities and gives specific requirements for all public buildings for accessibility. Are funeral homes complying with these guidelines, and, if not, what are they violating?

INTERMITTENT AUTOMOTIVE ELECTRICAL AND ELECTRONIC DIAGNOSTICS

David W. Gilbert, Ph.D.

Associate Professor, Automotive Technology

My research area examines a number of potential situations, diagnostic techniques, and case studies of intermittent automotive electrical problems. With the added complexity and interaction of numerous computerized systems on today’s vehicles, special attention to testing methods and details can be extremely important for safety and reliability. The most elusive type of electrical problem is one that is intermittent - appearing and vanishing without any readily identifiable cause. This unfortunate scenario can be costly to repair, and in some cases compromise vehicle safety. These factors prompted my authoring of an electronic engine controls paper dealing with electronic throttle control diagnostics and a subsequent invitation to provide expert testimony before the United States House of Representatives Committee on Energy and Commerce in February of 2010. This hearing was instrumental in furthering a congressional investigation on the safety and reliability of vehicle electronics. The congressional investigation examined vehicle manufacturing practices for the purposes of public safety, and most recently provided a basis for establishing “brake override” manufacturing standards for all electronic throttle controlled vehicles sold in the United States.

FLIGHT INSTRUCTOR BURNOUT AND COPING MECHANISMS

Steven Goetz

Assistant Professor, Aviation Management and Flight

The current regulatory climate encourages people to flight instruct that do not want to in order to move to the airline industry, and that can have a detrimental impact on the quality of student training. This can also lead to disenchantment with instruction for all flight instructors (CFIs). If CFIs are burning out because of the stresses placed on them, there could be an impact on aviation safety as these burned out instructors do not complete their students’ training as well as they had in the past and they themselves move to the airlines disenchanting with

the industry. This study will survey the CFI community to examine the state of burnout and what factors may influence that burnout such as demographic factors, flight experience, and geographic region. The survey will also examine coping strategies to see what strategies may be effective for CFIs to alleviate the stressors that can lead to burnout. If we can understand the state of burnout among CFIs, and the factors associated with that burnout, we can ensure that CFIs do the best job at training students they can and help maintain the safety of air travel in the U.S.

CARE HOUSING FOR YOUNGSTERS AT MATARO, SPAIN

Rolando Gonzalez Torres, Ph.D.

Associate Professor, Architecture

Mataro case is a municipal care housing solution (close to Barcelona) addressed to solve a punctual social situation about youngsters willing to emancipate but being unable to afford renting units due to the high market prices. It provoked the need to submit a new land-use bylaw allowing the municipality to entitle official land for housing purposes among private developers, and later to promote a design contest to get a low-cost building with decent living standards. The result is an amazing ensemble of 23 apartments on a 5 story building with a backside courtyard, an outstanding units' isolation and yet provokes well-balanced interaction between neighbors.

WIRELESS AND INTERNET SYSTEM MONITORING AND CONTROL

Martin A. Hebel

Associate Professor, Information Systems and Applied Technologies

Remote sensing and control of systems can be achieved using either local Wireless Sensor Networks (WSNs) that allow local communications or the use of Internet Of Things (IoT) technology for Internet communications. Embedded device programming for system interfacing and computer-based software are commonly used for end-to-end monitoring and control with WSN and IoT technologies. These technologies are being used extensively in industrial, biomedical, agricultural, building, and home automation and security.

As examples of applied research over the years, I have taught and published in these areas and worked with others in applying this technology including: wirelessly monitoring forces on citrus as it was shaken from trees for harvest, with the University of Florida; wirelessly monitoring crops for irrigation needs with the USDA, resulting in a patent; performing biological sensing with University of Sassari, Italy, presented at a NATO Conference. I have developed computer-based software packages for use with these technologies.

The use of WSN and IoT technologies can be relatively inexpensive and easily implemented for a variety of needs in research or application in the community. My research has spanned the application of monitoring and control technologies and I am seeking collaboration with researchers, community industries, and other interested parties.

WIRELESS MESH NETWORKS AND SOFTWARE DEFINED NETWORKS

Tom Imboden

Associate Professor, Information Systems and Applied Technologies

Networking and communication technologies are areas constantly changing as researchers and engineers strive to increase speeds and improve reliability as more and more devices are becoming Internet enabled and connectivity is expected by consumers at nearly all times. Two technologies that show promise to provide improvement for communications are wireless mesh networks (WMN) and software defined networks (SDN). WMNs allow extending wireless networks beyond traditional limitations of physical wired infrastructure. SDN seeks to provide centralized control of network nodes through the use of protocols to implement network changes on distributed infrastructure as directed by centralized management policy and direction. While both WMN and SDN provide unique promise for improved communication in certain scenarios, there has been little work combining the two technologies in a laboratory testbed. This discussion will focus on current work to implement WMN and SDN together and provide quantitative measurement of network performance across the test network.

SERIOUS GAMES IN AVIATION MAINTENANCE TRAINING

Karen Johnson

Associate Professor, Aviation Technologies

A serious game is a video game that is designed primarily to educate rather than solely to entertain. Serious games have been successfully used since the 1990s in fields such as military, education, healthcare, and corporate training. In aviation, the most common type of video games being used for training are the flight and air traffic simulators, which are related to serious games but still not the same. Currently, there are no video games, serious or not, being widely used in aviation maintenance training. This research focuses on the design and development of a serious game that can be used to teach two related fundamentals that are under-developed in most new aviation maintenance technicians; troubleshooting skills and human factors avoidance.

CAN A FASHION ADOPTION MODEL BE APPLIED TO OTHER DOMAINS OF STUDY?

Seung-Hee Lee, Ph.D.

Professor, Fashion Design & Merchandising

The successful adoption and diffusion of an innovative product or idea derives from knowledge of influences on the target population. One influence on adoption decisions, for example, is the potential adopter's perception of newness. The degree of newness or novelty can result in varying degrees of uncertainty, which affects a consumer's decision-making process. My most recent research has involved developing a new model of fashion adoption. Thus, a colleague (Dr. Jane Workman) and I have proposed and tested a fashion adoption model which resulted in an improved application to fashion phenomena. The paper, entitled "What do we know about fashion adoption groups? A proposal and test of a new model of fashion adoption" was published in a prestigious journal. My interest now is determining if the proposed and tested model can be applied to other domains of study. It can be a good initiative for a collaborative project both within and outside of the College.

RESILIENT CARBONDALE

Shannon McDonald, AIA

Assistant Professor, Architecture and Interior Design

How can we create a resilient Carbondale? How can we become self-sustaining in these challenging times? What do we already have that we can build upon? What creates resiliency in a community? How have past efforts such as solar, accessibility, and passive design strategies defined Carbondale as a progressive and compassionate community? How can we create a strategic plan that everyone can participate in to create a larger whole that works for all of us? These large questions could lead to a model rural community that has embraced its potential. What are perceived as limitations can actually be the "good stuff" that creates a community with the potential to embrace the future defining a Rural University Town.

DEVELOPMENT OF AN OPPOSED PISTON TWO STROKE GASOLINE AVIATION ENGINE

Donald Morris

Assistant Professor, Aviation Technologies

The most famous opposed piston two stroke engine ever to fly was the Jumo 206, developed by Nazi Germany to extend the benefits of diesel economy and long reliability to aviation. They did a remarkable job, but the engine fared poorly

against Spitfires in combat, and the project was largely abandoned. Some 50 years later, a renewed wave of interest in the concept has seen several major engine companies experimenting with the design in order to re-introduce its benefits. I began researching this same aspect several years ago before determining that my research would be largely duplicating that already done by others.

About this time, I began to wonder about the possibility of using the same two stroke opposed piston paradigm in a gasoline engine. If this paradigm could produce a diesel engine light enough to fly, what could it do to the gasoline engine? I found very limited past experimentation with this subject, but the results do indicate that an engine based on this technology could be nearly as light as current two stroke engines on the market, but still have the durability of current 4 strokes. At the same time, most of the pollution problems associated with current two strokes could be eliminated.

In this ongoing research presentation, I would like to share where I am in the development of this engine, and where I would like to go. I am currently looking for collaboration with engineering and computing resources in order to make this possible.

TOWARDS A LOW COST SYNTHETIC VISION CAPABLE GLASS COCKPIT

Donald Morris

Assistant Professor, Aviation Technologies

In the last few years, several world-changing things have occurred. Certainly the ability to build semiconductor based microchips with billions of transistors in less than the space of a postage qualifies. So, too, has the development of Micro Electromechanical Systems (MEMS) sensors. 30 years ago, a sensitive altimeter cost thousands of dollars. Today, a MEMS chip that costs less than two dollars is several times as precise. Another change is the availability of collaboration through open source software and hardware projects. These have given us low-cost processing power and the tools to harness it – converting our two dollar sensor into a very cheap and accurate altimeter package. We can make parts using another outcome of open source hardware and software – the modern, low-cost 3D printer.

Currently, I am working on interfacing low cost single-board computers (Raspberry PI) with open source Arduino microcontrollers and MEMS sensors to create a low cost synthetic Vision capable cockpit display. Programming of the single-board computer is through the open source platform Lazarus, an Object Oriented Pascal interface that allows OpenGL ES rendering of terrain graphics. I have written the specifications for a new TMTD Lazarus component which would form the core of a new open source cockpit platform. Optimized code is essential to allow these low cost computers to generate useful imagery in real time. This presentation will contain details of my work to date, as well as an invitation to those interested in collaboration to join me.

TASK FORCE FOR ASSISTED TECHNOLOGY RESEARCH AND APPLICATION

Robert Rados, Ph.D., MHA

Clinical Instructor, Health Care Management

Individuals with disabilities face many challenges and barriers associated with activities of quality daily living. Assisted technology is helping to reduce many barriers, including computing technology associated with searching for information and communicating with others. Students, faculty, and people of our local community have a desire and need to stay connected, to learn and enjoy the benefits of access to the internet.

This proposal is intended to establish a task force to promote assisted technology research and the application of existing assistive methods for those in need. As our society is aging, disability is becoming more common and user friendly assistive technologies can help everyone. New assisted technology methods are also needed.

The task force can bring together experts from across-campus and from the local community to address the present and future challenges and benefits of assisted technology research and application.

FACTORS INFLUENCING STUDENT SELECTION OF A COLLEGIATE AVIATION PROGRAM

Matt Romero

Assistant Professor, Aviation Management and Flight

Jose R. Ruiz

Professor, Aviation Management and Flight

The cost of higher education is skyrocketing. In 2015, The College Board [a non-profit association of colleges] reported that the cost of a higher education is increasing at an annual rate of approximately five percent (The College Board, 2017). In addition, the report stated that in 2015, the cost of a 4-year education (in-state tuition and fees) at a public university averaged \$39,400.00. The College Board also projected that by the year 2033, in-state, tuition and fees associated with a 4-year education from a public university could exceed \$94,800.00 (The College Board, 2017). For students pursuing a collegiate aviation education and aspiring to become professional pilots, flight training fees can easily represent an additional \$65,000.00 to that total (FAPA, 2016). To further compound the issue of increasing costs associated with the pursuit of a higher education, academic institutions are faced with growing budgetary constraints, coupled with mounting pressure to maintain or increase student enrollments (Allen, T.R. and Minniear, H.E., 2007). To remain competitive in this challenging environment, it is essential for aviation institutions to understand what issues discerning students consider when selecting a collegiate aviation program.

The purpose of this research study is to identify and measure the perceived value of individual institutional characteristics that influence a student's decision to select a collegiate aviation institution. Given the aforementioned challenges, gaining insight into what institutional characteristics students consider when selecting a collegiate aviation program would prove highly enlightening and useful to all collegiate aviation institutions. The population for this study will include current students from 10 prominent collegiate aviation institutions. The institutions participating in the study will represent all major geographic regions that encompass the U.S.; including 2-year and 4-year institutions; public, private and non-secular private collegiate aviation institutions. The study will employ an online survey questionnaire that will be composed primarily of Likert Scale formatted statements to gather data.

DESIGN/BUILD IN THE SCHOOL OF ARCHITECTURE

Chad Schwartz

Assistant Professor, Architecture and Interior Design

Laura Morthland

Associate Professor, Architecture and Interior Design

Jenny Huang

Assistant Professor, Construction Management

Design/build is a classification of practice in the architecture and construction fields in which the same entity both designs and builds a project. Starting in the 1960s, this practice has gradually made its way into the academic environment. Here, students generate a design and actively participate in transforming that design into a real structure or space. Over the past two decades, this pedagogical construct has become increasingly popular in schools of architecture for its ability to deliver a number of critical lessons to students through the first-hand experience of integrating the poetics of design with the practicalities of assembly and construction. In recent years, faculty and students in the School of Architecture have undertaken a number of design/build efforts with the hopes of teaching critical lessons to the participants through meaningful, haptic, and hands-on engagement. These projects have taken on two distinct styles. The first style occurs in the relatively high enrollment Building Technology I course, where the primary learning experiences center on the translation of drawn and modeled representations to actual built work. The second style occurs in low enrollment independent study courses and helps students engage with a wide variety of participants and stakeholders by introducing the processes involved in developing a real design project. Faculty research efforts over the past several years have helped refine the utilization of this pedagogy in service of our students and the Carbondale community. Our hope is to seek new partners to work with in coming semesters and to continue to push forward the use of design/build in the School of Architecture.

CASA RETENTION CHARACTERISTICS AND STUDENT SUCCESS AMONG ON-CAMPUS AND DISTANT EDUCATION STUDENTS

Thomas Shaw, Ph.D.

Associate Dean and Associate Professor, Mortuary Science and Funeral Services

Retention and attrition rates continue to be a major concern for universities. As the continued emphasis for online/distance education increases, there is becoming a more acute need to identify retention and attrition rates among students using more non-traditional education options. There is much research regarding student retention and the characteristics that negatively impact student commitment to persist and graduate. Retention models have evolved to not only include intrinsic factors, but extrinsic as well. Research is slight when factoring distant education student intrinsic and extrinsic factors into retention.

My research interest is in identifying what attributes will increase the likelihood of student retention and graduation for traditional on-campus face to face learning and students who choose online delivery as their primary method to learn. The purpose is to identify the difference in student characteristics and success among CASA's on-campus and distant education student populations. I am interested in looking for other faculty who might have a similar interest.

RADIOGRAPHY: IMPACTED THIRD MOLAR CASE STUDY

Jennifer S. Sherry, RDH, MSED

Associate Professor, Dental Hygiene

Sandi Watts, MHA, RTR, ARRT

Assistant Professor, Radiologic Sciences

Samantha Hennig

Dental Hygiene Student, Class of 2017

Molly Hogan

Dental Hygiene Student, Class of 2017

In a normal developmental tooth pattern, patients develop thirty-two permanent teeth. The last teeth to develop and erupt are the third molars. A common procedure performed by dentists and oral surgeons is third molar extraction. Third molar prophylactic treatment has been on the increase in many dental offices. Prophylactic treatment means the tooth is not causing any infection or harm to the surrounding tissue and is free of disease, but in any case, the tooth is extracted. This case study will show how leaving a third molar impaction may be detrimental to your patient's health and well-being.

Patient “R’s” symptoms gradually continued to decline over a period of a week. A complete dental history, medical history and radiographic assessment were gathered from Patient “R”. Pre-surgical and post-surgical panoramic images, along with CT scans were evaluated. The use of alternate views of radiographs (panoramic and CT scan) was extremely beneficial in the interpretation and diagnosis of “Patient R’s” condition.

Third molar removal surgery is a procedure that is very specific to each individual. Each patient can present with a variety of risks and implications to consider when treatment planning for removal of third molars.

FROM NEAT TO PREDICTIVE ANALYTICS

Andy Wang, Ph.D.

Professor, CASA Dean’s Office

The NEAT initiative in the College of Applied Sciences and Arts is a process to improve retention rates and student success through four critical time-points in a semester, represented by the four letters in “NEAT.” The letter “N” refers to a “no-show” report in the first week; “E” is an “engagement” report at the end the fourth week; “A” is at the end of the eighth week, when students should have “access” to their middle term grades; and “T” is the “term” performance assessment at the end of a semester. NEAT has been helping improve our student academic performance, especially for those potentially at-risk students. However, NEAT is largely reactive in its nature, rather than proactive. We need a better tool to predict and subsequently support student academic success. For instance, we need a tool to predict whether a student will earn a C or better in a given course before the withdraw deadline, even during the first week, based on the student performance in this course, prior academic performance, and key demographic characteristics.

Predictive analytics uses many techniques from data mining, statistics, modeling, machine learning, and artificial intelligence to analyze current data to make predictions about the future. It will help us to identify academically at-risk students early so that the students have a better opportunity to improve their academic achievement and career success. Faculty and advisors may intervene with struggling students before it is too late. The success of predictive analytics depends, in a large part, on reliable input data and big data technologies. We need a series of risk factors as the input to the analytic system, including attendance record, homework or assignment grades, quiz grades, RSO membership, level of social integration into campus life, study skills, etc. It is best to integrate with our current student database and teaching/learning tools, such ARGOS, SSC, D2L, Hobsons Connect, etc. The consolidation of academic, demographic, and social data will be turned, through the predictive analytics system, into interventions that help individualized student success.

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