ASA

MULTIDISCIPLINARY RESEARCH SYMPOSIUM

Emerging Technologies
Innovation in the Applied Sciences and Arts

College of Applied Sciences and Arts
Transportation Education Center [TEC]
Southern Illinois University
October 14th-15th, 2016

SIU Southern Illinois University
CARBONDALE

Friday 14 October
Transportation Education Center

10:00   **Registration**

10:30   **Panel Discussion | Unmanned Aerial Systems (UAS) - What are they?**

Mike A. Burgener | Aviation Technologies | SIU
Jim Peterson, PhD | Gateway Geospatial
Wayne R. Glass | Office of Sponsored Projects Administration | SIU
Steve Goetz | Aviation Management and Flight | SIU
Mike Robertson | Aviation Management and Flight | SIU
A panel of five aviation experts will discuss Unmanned Aerial Systems (UAS). Particular emphasis will be placed on the rules governing UAS operation. A UAS operational demonstration will be conducted.

11:30   **Lunch**

12:30   **Panel Discussion | Sustainable Mobility for Rural Small University Towns**

Shannon McDonald | School of Architecture | SIU
Stanley Young, PhD | National Renewable Energy Laboratory
Sam Chung, PhD | School of Information Systems and Applied Technology | SIU
Michael Behrmann | Automotive Technology | SIU
Shelby Orr | School of Architecture | SIU
Moderator: Ralph Tate | Automotive Technology | SIU
How can all of the emerging changes in transportation affect a small rural University town? This panel will discuss the opportunities and the drawbacks to automated vehicles, shared vehicles, electric, and solar powered vehicles. The panel will be comprised of various academics and professionals involved with these new transportation changes.

2:00   **Break + Refreshments**

2:15   **Workshop | Strategies for Successful Grant Seeking**

Becky S. Robinson, PhD | College of Applied Sciences and Arts | SIU
The Strategies for Successful Grant Seeking workshop will provide participants with an engaging understanding of how and where to find federal, state, and foundation grant opportunities; design projects for grant seeking; and write competitive grant proposals to increase the chance of funding your project and achieving your grant goals and objectives.

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SIU GRADUATE SCHOOL

Saturday 15 October | Transportation Education Center

8:00	**Registration + Refreshments**
8:45	**Welcome Address + Guest Speaker**	Geory Kurtzhals	SIU Sustainability Coordinator	TEC Multipurpose Room

9:30

Session I | Aviation | AutoLAB

The Effect of Using Noise Reduction Turbofan Engine Exhaust Nozzle Designs on a Turbojet Engine
Donald Bartlett + Eric Bell | SIU
The effect of using three different noise reduction turbofan engine exhaust nozzle designs on a turbojet engine.

Technological Advances of Diesel Engines within the Aviation Industry
Daniel Mattingly | SIU
Brief history of the diesel engine and how technological advances are making the use of a diesel engine more feasible in powering general aviation aircraft and light helicopters.

A Bioinspired Modification for UAS Propeller/Rotor Noise Reduction
Mark Callender | Middle Tennessee State
This project presents a bioinspired modification to UAS propellers/rotors for noise reduction. Sound pressure levels (SPL) and thrust for modified propellers were compared to a baseline propeller.

Session II | Sustainability | Room 181

SIU Bicycle Master Plan
Shelby Orr + Shannon McDonald | SIU
This presentation will discuss the results of an SIU Bicycle Survey, supported by a 2015 Sustainability Grant and the work of the SIU Bicycle Master Plan Committee. The resulting Master Bike Plan will accurately assess SIU's current infrastructure, education, and encouragement of bicycling and create a plan to address and improve biking on campus.

Lactation Accommodation at SIU
Laura Morthland, Qian Huang, Deborah Barnett + Chad Schwartz | SIU
The presentation outlines a project undertaken by a multidisciplinary team of staff, faculty, and students at Southern Illinois University to provide a dedicated space for nursing mothers in the campus' Morris Library.

Session III | Design | Room 182

Buildings as an Assembly of 3D Printed Components
Stephen Lauer | SIU
This project examines the strategies necessary to design and fabricate a house using 3d printing technology.

Rethinking the Design Models of Refugee Camps: Aiming for Stability while Planning for Temporality
Ruba Bdair | SIU
This research explores alternatives to existing models for accommodating refugees. Aiming to create self-sufficient communities that fulfill refugees' needs and lessen the stress on hosting countries' resources, the redesigned part of Azraq camp in Jordan provided the study material for the consequences that would stem from implementing the new model.

The Unexamined Life of Studio Instructors: The Evolution Process of Teaching Practice in the School of Architecture at the University of Kansas
Maryan Ashkan | University of Kansas
The majority of novice instructors and academics in higher education are usually disciplinary experts with research capabilities. They have little to no preparation in pedagogy. This research sheds light on the unexamined life of studio instructors at KU.

Geory Kurtzhals | 8:45am
Southern Illinois University Sustainability Coordinator

This address will focus on the relationship between sustainability and innovation in the Applied Sciences and Arts, highlighting the current need for sustainability and how it fits into higher education and the careers for which we are preparing our students. The presentation will include model examples of innovative sustainability related solutions.

Dr. Stanley Young | 11:45am
National Renewable Energy Laboratory

In the midst of funding shortfalls, mounting infrastructure replacement needs, and increased pressure to lessen dependence on petroleum fuels, cities, counties, MPOs and states are planning for the next generation of surface mobility, understanding that vehicle automation and communication are rapidly transforming user expectations. These changes will also have significant impact on energy, emissions, and requirements for roadway infrastructure. We are just not sure what those impacts are going to be. This talk examines some of these pressures, early evidence on what those impacts could be, and initial efforts to plan the future in light of the uncertainty.

Keynote Speakers

10:30   **Break + Refreshments**

10:45   ## Session IV | Aviation | AutoLAB   Session V | Design | Room 182   Session VI | ISAT | Room 181

Status of Safety Management Systems Implementation for Flight Training Providers
Mike Robertson | SIU
This research project investigated the level of Safety Management System (SMS) development and implementation that exists for flight training providers. The outcomes could be used to assist in the development of future guidance as well as determine potential training needs of the flight training providers regarding SMS.

Perspectives and Researcher Experiences of Extracurricular Undergraduate Research
Steven Goetz | SIU
This study examined the perceptions of the experiences of undergraduate researchers using qualitative methods to understand why they engaged in research and what the effects of the research were on their academic endeavors and plans and future plans within the aviation industry.

SIUC/UIC National Summer Transportation Institute
Steven Goetz and Andy Weis | SIU
The National Summer Transportation Institute (NSTI) is a grant funded program through the Department of Transportation. SIU partnered with the CHANCE program at the University of Illinois at Chicago to bring this program to Chicago high school students to expose them to the transportation industry and career areas they may not have considered previously.

NASA Wings Summer Camp
Lorelei Ruiz and Steven Goetz | SIU
The NASA Wings summer camp is a grant funded educational outreach project funded by NASA's Space Communication and Navigation division. This program is designed to give high school students the opportunity to learn about the aerospace industry and STEM fields and aerospace career opportunities.

Examining Strategies for Delivering Design/Build Content in High-Enrollment Architecture Courses
Chad Schwartz | SIU
This presentation examines efforts to expand the influence of the design/build experience within a school of architecture. It examines the strategies utilized over a three-year period to translate the learning experience of design/build studio into a building technology course serving between 40 and 60 students annually.

Designing Sustainable Communities for Automated Transit Networks
Shannon McDonald | SIU
Automated Transit Networks have the potential of changing the design of communities. Transportation is one of the key aspects for structuring our built environment. Now that Automated Transit Networks are being re-examined, early studies integrating them into the built environment can provide insight into their potential applications.

The DESIGN DRIVE
Helen Turner, Brad Fister + Patrick Lucas | University of Kentucky
A single-source, online database with a unique mode of sharing technical knowledge and theoretical information that engages twenty-first century design education deeply shaped by technology, grounded in instant connection, and populated by wide-ranging digital data to enhance web-based teaching and learning.

The Wotan Beowulf Cluster Project
Carson Wang and Jacob Buys | Carbondale Community High School
The Wotan project moves into its second year in which high school students, in liaison with SIU, have implemented Hadoop and various experiments. Insight on the challenges and requirements of current practices in Big Data analysis will be presented.

Secure Mobile Applications based on NTRU
Vikran Hegde, Hanquing Zhao + Kefeng Shi | Fontbonne University
Modern mobile devices have an urgent need for a new-generation public-key cryptographic system. This system should provide sufficient security for mobile devices without degrading performance due to their limited resources. NTRU is a decent model for this. We validate it through experimental studies and apply NTRU to protect a peer-to-peer communication app.

Southern Illinois University's BigDog High Performance Computing Cluster
Chester Langin | SIU
This presentation is a short introduction to SIU's new BigDog high performance computing cluster (HPCC), a supercomputer which operates at a theoretical 34.7 Tflops. The BigDog cluster consists of 40 servers totaling 800 CPUs. BigDog is free to university researchers, including faculty and students with faculty supervision.

11:45   **Lunch + Guest Speaker** | Dr. Stanley Young | National Renewable Energy Laboratory | TEC Multipurpose Room

Saturday 15 October | Transportation Education Center

1:00 **Poster Review Session + Student Poster Competition** | TEC Multipurpose Room

2:00 **Break**

2:15

Session VII | Design | Room 182

Occupancy Estimation in Smart Buildings using Wireless CO2 Sensor Network
Chen Mao and Qian Huang | SIU
Smart building is gaining increasing attention. Among various aspects of studies, building energy efficiency is a big concern. We implement a wireless CO2 sensor network to dynamically estimate room occupancy. Experimental results show a good accuracy, which has great potential to coordinate with HVAC systems to realize smart efficient buildings.

Cross-Cultural Comparison between US and China on Perception of Time, Creative Attitudes, and Adoption of Fashion Innovations
Seung-Hee Lee | SIU
In the process of fashion diffusion, knowledge diffuses within and among social networks. However, little knowledge and evidence exists regarding the relationships among time perception, creative attitudes, and adoption of fashion innovations across different cultures. This research on relationships among perceptions of time, creative attitudes, and adoption of innovations has important implications for global fashion marketing.

Session VIII | Student Success | 181

Blockchain Technology and its Applications
Andy Wang | SIU
Blockchain technology enables all stakeholders in higher education to improve trust and transparency. As electronic portfolios evolve from information repositories to robust tools for showcasing student learning, the next generation of assessment tools, measuring program quality and student learning outcomes, will be built using Blockchain technology. The presentation discusses the state of the art in Blockchain technology and its applications, focusing on applications in higher education.

Student Engagement and Persistence via Co-Curricular Activities
Thomas Shaw | SIU
Development of a research study to investigate how student engagement, as measured by co-curricular involvement, might influence student persistence. Coverage will include a review of current research in the area and map out the anticipated research design. This exploratory study can serve as a foundation for student persistence/retention activities.

Session IX | Automotive | AutoLAB

Drivability of the FIAT 500 Multi-Air Engine under Simulated Poor Maintenance
Andrew Croxell | SIU
The FIAT Multi-Air valve-train uses hydraulic, mechanical, and electric components to control engine intake valves for more precise combustion. However, the incorporation of electronics and hydraulics creates additional potential for drivability issues. This study will simulate poor vehicle maintenance in a FIAT 500 Multi-Air engine to identify drivability concerns generated.

The Effects of Electronic Throttle Control Systems on Gasoline Internal Combustion Engine Compression Testing Procedures
Blaine Heisner | SIU
A study of the results of engine compression testing on vehicles equipped with electronic throttle control. A sample of vehicles was tested in a controlled manner using a variable procedure to determine a statistically significant result. The purpose of the research is to determine a valid compression testing procedure for ETC equipped vehicles.

Measuring Baseline Data for Linear Solenoids Used in Late-Model Automatic Transmissions
Sean Boyle | SIU
Can automatic transmission solenoids be adequately tested using common equipment found in a typical transmission repair facility? Popular solenoids were electronically tested while the solenoids were supplied with heated and pressurized automatic transmission fluid. The resulting oscilloscope graphs from properly operating solenoids may be useful when determining if a solenoid is approaching failure.

3:15 **Break + Refreshments**

3:30 **Awards Presentation + Closing Remarks** | TEC Multipurpose Room