

# **2014 Systems and Information Engineering Design Symposium**

**(SIEDS 2014)**

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## **Technical Sessions**

**10:15 AM - 12:20 PM**

### **DSGN: SYSTEMS DESIGN**

Systems Design and Integration Track

Room: Zehmer B

Chairs: Larry Bonczar (University of Virginia), Elizabeth Connelly (University of Virginia)

10:15 *Design of Interactive Cancer Education Technology for Latina Farmworkers*<sup>3</sup>

Ying Wu (University of Virginia); Devan Samant (University of Virginia); Kristen Squibbs (University of Virginia); Alexis Chaet (University of Virginia); Bijan Morshedi (University of Virginia); Laura E Barnes (University of Virginia)

10:40 *Increasing Fuel Savings of Class-8 Tractor-Trailers by Reducing Aerodynamic Drag*<sup>8</sup>

Ziza Machado (James Madison University); Donald Casey VanWingerden, II (James Madison University); Jordan Pappas (James Madison University); Bryan McAlexander (James Madison University); John LeMaire (James Madison University); Olga Pierrakos (James Madison University); Heather Watson (James Madison University)

11:05 *Fluid Handling and Environmental Management for Automated 3-D Cell Culturing*<sup>34</sup>

Kelvin Green (University of Virginia); Ashutosh Panchang (University of Virginia); Evan D'Agostini (University of Virginia); Hanke Meng (University of Virginia); Ryan Bates (University of Virginia); Reid Bailey (University of Virginia); Amy LaViers (University of Virginia & Robotics, Automation, and Dance (RAD) Lab)

11:30 *Design of a Distributable Stereo Hearing Test Package*<sup>3</sup>:

Brittany Harwell (James Madison University); Tanvir Battu (James Madison University); Sofia Ganev (James Madison University); Robert Nagel (James Madison University); Lincoln Gray (James Madison University); Bradley Kesser (University of Virginia)

- 11:55 *Designing a Spatially Aware, Automated Quadcopter Using an Android Control System*<sup>45</sup>  
Carolyn Pearce (University of Virginia); Margaret Guckenberg (University of Virginia); Bobby Holden (University of Virginia); Andrew Leach (University of Virginia); Ryan Hughes (University of Virginia); Connie Xie (University of Virginia); Meredith Hassett (University of Virginia); Andrew Adderley (University of Virginia); Laura E Barnes (University of Virginia); Mark Sherriff (University of Virginia); Gregory C Lewin (University of Virginia)

## **MDL: OPTIMIZATION & MODELING**

Modeling & Optimization Track

Room: Zehmer C

Chairs: Roy Hayes (University of Virginia), Nicholas Napoli (University of Virginia)

- 10:15 *An Integer Program for Open Locating Dominating Sets and Its Results on the Hexagon-Triangle Infinite Grid and Other Graphs*<sup>4</sup>;  
Daniel B Sweigart (The College of William and Mary & US Coast Guard); Julia Presnell (The College of William and Mary); Rex Kincaid (The College of William and Mary)
- 10:40 *Symmetrical Close Packing of Cylindrical Objects*<sup>55</sup>  
Samuel Laney (University of Tulsa)
- 11:05 *The Robust Maximum-Coverage Problem*<sup>5</sup>: "  
Ian Sturdy (The College of William and Mary); Rex Kincaid (The College of William and Mary)
- 11:30 *Campus Motor Fleet Analysis for the FAA Technical Center to Meet Executive Order 13514*<sup>64</sup>  
Shane Armstrong (George Mason University); Caleb Benn (George Mason University); Alicia Kubokawa (George Mason University); Kelly Prim (George Mason University)
- 11:55 *Cost-Performance Analysis and Optimization of a Data Mining Prefetching Algorithm: DM-PAS*<sup>\*</sup>  
Soumya Saha (Texas A&M University-Kingsville); Mais Nijim (Texas A&M University-Kingsville); Arka Biswas

(Texas A&M University-Kingsville); Kazi Rayhanul Islam  
(Texas A&M University-Kingsville)

## **ENV: ENVIRONMENTAL SYSTEMS**

Environmental & Socio-Technical Systems Track

Room: Zehmer D

Chairs: Vince Pulido (University of Virginia), Scott Remer  
(University of Virginia)

10:15 *Management of Construction and Demolition Waste  
in the Region of Waterloo*""75

Avneet Button (University of Waterloo, Canada); John Lee  
(University of Waterloo, Canada); David Marshall (University  
of Waterloo, Canada); Zoha Dawood (University of Waterloo,  
Canada); Shawn MacLellan (University of Waterloo,  
Canada); Honorio Umali, Jr (University of Waterloo, Canada);  
Sheree Pagsuyoin (University of Waterloo, Canada)

10:40 *Reducing Electronic Waste Through the  
Development of an Adaptable Mobile Device*""79

Madeleine Brannon (George Washington University); Phillip  
Graeter (George Washington University); Donald Schwartz, Jr  
(George Washington University & Service Logic LLC); Joost  
Santos (George Washington University)

11:05 *Feasibility Study of Bioethanol Production From  
Agricultural Waste in Southwestern Kenya*""85

Robert Chlumsky (University of Waterloo, Canada); David  
Stewart (University of Waterloo, Canada); Rachel Trower  
(University of Waterloo, Canada); Joel Upsdell (University of  
Waterloo, Canada); Dao Yu (University of Waterloo, Canada);  
Honorio Umali, Jr (University of Waterloo, Canada); Sheree  
Pagsuyoin (University of Waterloo, Canada)

11:30 *Design of a Dam Sediment Management System to  
Aid Water Quality Restoration of the Chesapeake  
Bay*""8:

Rayhan Ain (George Mason University); Kevin Cazenias  
(George Mason University); Sheri Gravette (George Mason  
University); Said Masoud (George Mason University)

11:55 *Alternative Management of Organic Waste in Chatham-Kent, Ontario, Canada*''96

Alexis Blair (University of Waterloo, Canada); Graeme Hollands (University of Waterloo, Canada); Kylee McIntosh (University of Waterloo, Canada); Adriana MacDonald (University of Waterloo, Canada); Bhumi Mehta (University of Waterloo, Canada); Honorio Umali, Jr (University of Waterloo, Canada); Sheree Pagsuyoin (University of Waterloo, Canada)

**DEC: DECISION ANALYSIS APPLICATIONS**

Decision and Risk Analysis Track

Room: Zehmer E

Chairs: Sean Gallahan (University of Virginia), Annamalai Muthiah (University of Virginia)

10:15 *Design of an Underwater Mine Detection System*''9: "

Siamak Khaledi (George Mason University); Hari Mann (George Mason University); James Perkovich (George Mason University); Samar Zayed (George Mason University)

10:40 *Design of a Flight Planning System to Reduce Persistent Contrail Formation to Reduce Greenhouse Effects*''': 6

Harris Tanveer (George Mason University); David Gauntlett (George Mason University); Jhonnattan Diaz (George Mason University); Po-Cheng Yeh (George Mason University)

11:05 *Non-Kinetic Operations for Stabilizing Government*''"; 2

Collin D'Antonio (United States Military Academy); Stephanie Gower (United States Military Academy); Andrea Young (United States Military Academy); Edward Teague (United States Military Academy)

11:30 *Intelligence Surveillance Reconnaissance "Search Window*''''"; 8

Jacob Bennett (United States Military Academy); Jordan Lee (United States Military Academy & Company E-1); Michael Sikorski (United States Military Academy & ISR Search Window Capstone); Della Taylor (United States Military Academy)

11:55 *Multi-Modal Transportation Optimization of a Local Corridor*""324

Britton McMahon (James Madison University); Nick Ferguson (James Madison University); Mallory Draeger (James Madison University); Haley Moberg (James Madison University); Elise Barrella (James Madison University)

**DTA: PROCESS MODELING**

Process Modeling & Data Analytics Track

Room: Zehmer Lounge

Chairs: Michelle Hamilton (University of Virginia), Sarah Lightbody (University of Virginia)

10:15 *Identification and Mitigation of Potential Logistical Issues in the Relocation of the UVA Health System's Outpatient Surgery Center*""329

Katherine Brock (University of Virginia); Laura Chitty (University of Virginia); Michael Smith (University of Virginia); Barry Wagner (University of Virginia Health System)

10:40 *Automated Nuclear Control Room Analysis*\*

Aricka Clark (Liberty University); Connor High (Liberty University); Morgan Becker (Liberty University); Samuel Abebe (Liberty University)

11:05 *A Mixed-Methods Assessment of Time Spent Documenting by Nurses Using an Electronic Medical Records System*""33:

Niklas Philipsen (University of Virginia); William Carruthers (University of Virginia); Grace Chi (University of Virginia); David Ensey (University of Virginia); Alexander Shmorhun (University of Virginia); Rupa Valdez (University of Virginia)

11:30 *Design to Improve the Freshman Admissions Process*""346

Mary Barthelson (George Mason University & Audio Video Systems Inc.); Issam Boumlic (George Mason University); Ummer Shamma (George Mason University)

11:55 *Analysis of Communication Patterns in Critical Care Environments*'''34;

Lan-Vy Ngo (University of Virginia); Katherine Walker (University of Virginia); Anna Holowinsky (University of Virginia); Grace Knox (University of Virginia); Robert Shimberg (University of Virginia); Nicholas Napoli (University of Virginia); Jacob Gillen (University of Virginia Health System); Jeffrey Young (University of Virginia Health System); Laura E Barnes (University of Virginia)

**12:20 PM - 1:20 PM**

**LNCH: POSTER SESSION & LUNCH**

Chairs: Jin Li (University of Virginia), Sarah Lightbody (University of Virginia), Nicholas Napoli (University of Virginia), Vince Pulido (University of Virginia)

**1:20 PM - 3:00 PM**

**DSGN: DESIGN INTEGRATION**

Systems Design and Integration Track

Room: Zehmer B

Chairs: Sarah Lightbody (University of Virginia), Vince Pulido (University of Virginia)

1:20 *Low-Cost Thin-Film Deposition Apparatus for Solar Applications*'''357

Melissa Dutter (James Madison University); Kyle Davis (James Madison University); Robert Spelman (James Madison University); Joel Groetsema (James Madison University); Keith Hutchison (James Madison University); Keith Holland (James Madison University)

1:45 *NavEye: Smart Guide for Blind Students*'''363

Hamza Al Abri (Sultan Qaboos University, Oman); Ahmed Al Wasti (Sultan Qaboos University, Bahrain); Mohammed Maawali (Sultan Qaboos University, Oman); Ali Al Shidhani (Sultan Qaboos University, Oman)

- 2:10 *Designing a Hexacopter for the Collection of Atmospheric Flow Data*""369  
Ian deBoisblanc (University of Virginia); Nikita Dodbele (University of Virginia); Lee Kussmann (University of Virginia); Rahul Mukherji (University of Virginia); Doug Chestnut (University of Virginia); Stephanie Phelps (University of Virginia); Gregory C Lewin (University of Virginia); Stephan de Wekker (University of Virginia)
- 2:35 *Robotic Platform for Photography Applications*""375  
Brian Bojarski (James Madison University); Evan Brown (James Madison University); Blake Lumpkin (James Madison University); Jacquelyn Nagel (James Madison University); Robert Nagel (James Madison University); John Quackenbush (James Madison University & Department of Engineering); Margaret Robinson (James Madison University)

## **MDL: MODELING**

### Modeling & Optimization Track

Room: Zehmer C

Chairs: Scott Remer (University of Virginia), Jacob Scanlon (University of Virginia)

- 1:20 *P-Median Problems with Edge Reduction*""37; "  
Jana Hartman (The College of William and Mary); Rex Kincaid (The College of William and Mary)
- 1:45 *A Novel Energy Efficient Topology Control Algorithm for Wireless Sensor Networks\**  
Abhishek Deshpande (Texas A&M University-Kingsville); Lifford McLauchlan (Texas A&M University-Kingsville)
- 2:10 *An Energy Balanced Topology Construction Protocol for Wireless Sensor Networks\**  
Soumya Saha (Texas A&M University-Kingsville); Lifford McLauchlan (Texas A&M University-Kingsville)
- 2:35 *Videology and the Future of Online Video Advertising*""394  
Tianning Huang (University of Virginia); John Callaway (University of Virginia); Brittany Oliver (University of Virginia); Kristofer Peck (University of Virginia); John Gillen (University of Virginia); Parker Bleam (University of Virginia); William Scherer (University of Virginia)



## **ENV: ENERGY AND MATERIAL SYSTEMS**

Environmental & Socio-Technical Systems Track

Room: Zehmer D

Chairs: Elizabeth Connelly (University of Virginia), Roy Hayes (University of Virginia)

1:20 *Design of a Climate Adaptable Solar Energy System Using Biomimetic Inspiration From a Lichen Symbiosis*'''399

Nicolas Acton (James Madison University); Melissa Bernazani (James Madison University); Jonathan Hill (James Madison University); Michael Hinton (James Madison University); Aaron Vazquez (James Madison University); Kyle Gipson (James Madison University); Jacquelyn Nagel (James Madison University)

1:45 *Evaluation of Waste Reduction and Diversion as Alternatives to Landfill Disposal*'''3: 5

Kevin Lai (University of Waterloo, Canada); Linda Li (University of Waterloo, Canada); Sammy Mutti (University of Waterloo, Canada); Rebecca Staring (University of Waterloo, Canada); Max Taylor (University of Waterloo, Canada); Honorio Umali, Jr (University of Waterloo, Canada); Sheree Pagsuyoin (University of Waterloo, Canada)

2:10 *Effects of Smart Appliances on Residential Consumption Patterns*'''3: :

Nathan Krishnan (George Washington University); Thomas Dirienzo (George Washington University); Srija (George Washington University); Joost Santos (George Washington University)

2:35 *Design of a Two-phase Solar and Fluid-based Renewable Energy System for Residential Use*'''3; 5

Eric Leaman (James Madison University); Jack Cochran (James Madison University); Jacquelyn Nagel (James Madison University)

## **DEC: MORE DECISION ANALYSIS APPLICATIONS!**

Decision and Risk Analysis Track

Room: Zehmer E

Chairs: Jin Li (University of Virginia), Annamalai Muthiah (University of Virginia)

- 1:20 *Design of a Quadcopter for Winning the Jerry Sanders Creative Design Competition*<sup>3</sup>; :  
Jordan Bramble (George Mason University); Harold Merida (George Mason University); Ibtsam Khan (George Mason University)
- 1:45 *Irregular Warfare Models for Regional Stability*<sup>426</sup>  
Robert Dewoody (United States Military Academy); Jacob Hayes (United States Military Academy); Nicholas Isnardi (United States Military Academy); Joseph Kalinka (United States Military Academy); Edward Teague (United States Military Academy)
- 2:10 *Design of a Single Pilot Cockpit for Airline Operations*<sup>432</sup>  
Jonathan Graham (George Mason University); Christopher Hopkins (George Mason University); Andrew Loeber (George Mason University); Soham Trivedi (George Mason University)
- 2:35 *SAGE Urban Operations Tool Suite Methodology*<sup>438</sup>  
John Egan (United States Military Academy); Daniel Eo (United States Military Academy); Matthew Hughes (United States Military Academy); Jason Lee (United States Military Academy)

## **DTA: DATA ANALYTICS**

Process Modeling & Data Analytics Track

Room: Zehmer Lounge

Chairs: Larry Bonczar (University of Virginia), Sean Gallahan (University of Virginia)

1:20 *Advertising.com: Mobile Optimization and Prediction Segments*""444

Andrew Strauss (University of Virginia & AOL - Advertising.com); Robert Hayes (University of Virginia); Colin Leslie (University of Virginia); Elizabeth Stettinius (University of Virginia & AOL - Advertising.com); Sachin Tewari (University of Virginia); James Valeiras (University of Virginia); William Scherer (University of Virginia)

1:45 *Automated Prediction of Adverse Post-Surgical Outcomes*""449"

Katharine Hergenroeder (University of Virginia); Timothy Carroll (University of Virginia); Alec Chen (University of Virginia); Caroline Iurillo (University of Virginia); Peter Kim (University of Virginia); Zachary Turner (University of Virginia); Matthew Gerber (University of Virginia); Donald Brown (University of Virginia)

2:10 *Automatic Identification of Alcohol-Related Promotions on Twitter and Prediction of Promotion Spread*""455

Asha Menon (University of Virginia); Fallon Farmer (University of Virginia); Timothy Whalen (University of Virginia); Beini Hua (University of Virginia); Kareem Najib (University of Virginia & School of Engineering and Applied Science); Matthew Gerber (University of Virginia)

2:35 *Using Supervised Learning to Classify Clothing Brand Styles*""45;

Christopher Kreyenhagen (University of Virginia); Timur Aleshin (University of Virginia); Joseph Bouchard (University of Virginia); Adam Wise (University of Virginia); Rachel Zalewski (University of Virginia)

**3:15 PM - 4:55 PM**

**DSGN: SYSTEMS INTEGRATION**

Systems Design and Integration Track

Room: Zehmer B

Chairs: Elizabeth Connelly (University of Virginia), Sarah Lightbody (University of Virginia)

3:15 *Analysis of Manual Manufacturing Processes Using Motion Sensing Technologies*<sup>466</sup>

Wenchang Han (University of Virginia); Xiaoqian Liu (University of Virginia); Jack Radcliffe (University of Virginia); Maryam Ghariban (University of Virginia); Jane Wei (University of Virginia); Kevin Chung (University of Virginia); Peter Beling (University of Virginia)

3:40 *A Comparative Performance Analysis of MUSIC, root-MUSIC and ESPRIT Algorithms for Angle of Arrival Estimation on ULA\**

Soumya Saha (Texas A&M University-Kingsville); Rajab Chaloo (Texas A&M University-Kingsville)

4:05 *A Novel Flow Performance Metric for the Assessment of Prosthetic Heart Valves*<sup>477</sup>

Daniel E Vargas (James Madison University); Brad Weidner (James Madison University); Genevieve D'Antonio (James Madison University); Olga Pierrakos (James Madison University)

4:30 *Mining and Sonifying Motion Data for Mitigating Driver Distraction\**

Harvey Ngo (University of Virginia); Henry Steuer (University of Virginia); Ishaan Chaudhary (University of Virginia); Alexander Mulchandani (University of Virginia); Nathan Lau (University of Virginia)

## **MDL: SIMULATION**

Modeling & Optimization Track

Room: Zehmer C

Chairs: Annamalai Muthiah (University of Virginia), Scott Remer (University of Virginia)

- 3:15 *Verification and Validation of the Infantry Warrior Simulation (IWARS) Through Engagement Effectiveness Modeling and Statistical Analysis*""482  
Joshua Eaton (United States Military Academy); Ryan Kalnins (United States Military Academy); Mitchell Mckearn (United States Military Academy); Preston Wilson (United States Military Academy); Andrew Zecha (United States Military Academy)
- 3:40 *Deep Space Storm Shelters and Discrete Event Simulation*""488  
Kathryn Dugan (The College of William and Mary & NASA); Rex Kincaid (The College of William and Mary)
- 4:05 *Computational Modeling to Predict Pilot's Expectation of the Aircraft State Given Vestibular and Visual Cues*""493  
Can Onur (Georgia Institute of Technology); Anil Bozan (Georgia Institute of Technology); Amy Pritchett (Georgia Institute of Technology)
- 4:30 *Comparison of Army Aviation Maintenance Methods Via Discrete Event Simulation* ""499  
Zachary Bell (United States Military Academy); Edward Teague (United States Military Academy)

## **ENV: SOCIO-TECHNICAL SYSTEMS**

Environmental & Socio-Technical Systems Track

Room: Zehmer D

Chairs: Rujira Chaysiri (University of Virginia), Jin Li (University of Virginia)

3:15 *Iterative Design and Information Communication Technology for Community Development*''4: 5

Jacob Sztraicher (University of Virginia); Laura Morgan (University of Virginia); Emir Okaygun (University of Virginia); Michael Terrell (University of Virginia); Austin Fry (University of Virginia); Siddhartha Pailla (University of Virginia); Garrick Louis (University of Virginia)

3:40 *Preliminary Design for a Paratransit Tracking System to Inform Planning Decisions in Urban Centers in Developing Countries*''4: ;

Ethan Thompson (James Madison University); Joshua Yeager (James Madison University); Matthew Boyer (James Madison University); Justin Henriques (James Madison University)

4:05 *Systems Thinking Applied to Slavery*''4: 6''

Sarah Melville (United States Military Academy); Garrett Kastl (United States Military Academy); Christy Licklider (United States Military Academy)

4:30 *Data Integration for the Thomas Jefferson Area Community Criminal Justice System*''522

Brittany Fuller (University of Virginia); Derek Gale (University of Virginia); Stephanie Garbo (OAR/JACC); Jessica James (University of Virginia); Andreea Linte (University of Virginia); Michael Smith (University of Virginia); K. White, Jr. (University of Virginia)

## **DEC: RISK ANALYSIS**

Decision and Risk Analysis Track

Room: Zehmer E

Chairs: Sean Gallahan (University of Virginia), Jacob Scanlon (University of Virginia)

3:15 *Design of A Cyber Security Framework for ADS-B Based Surveillance Systems*""526

Sahar Amin (George Mason University); Tyler Clark (George Mason University); Rennix Offutt (George Mason University); Kate Serenko (George Mason University)

3:40 *Risk Management of Transportation Networks with Dynamic Segmentation and Multicriteria Data Analytics\**

Yue Bi (University of Virginia); Daniel Codeluppi (University of Virginia); Nelson Fu (University of Virginia); Cherie Magennis (University of Virginia); Akira Powell (University of Virginia & VDOT); Samuel Sisto (University of Virginia); Michelle Hamilton (University of Virginia); Junrui Xu (University of Virginia); James H. Lambert (University of Virginia)

4:05 *Systemic Risk in the United States Banking Industry*""532

Johnathon Peruski (University of Virginia); Caroline Lacy (University of Virginia); Walter Goethel (University of Virginia); Matthew Boegner (University of Virginia); Jack Byers (University of Virginia); Henry Gorog (University of Virginia); Peter Beling (University of Virginia)

4:30 *Risk Analysis of GPS-Dependent Critical Infrastructure System of Systems*""538

Kenneth Chen (University of Virginia); Cedric Heckel-Jones (University of Virginia); Nicholas Maupin (University of Virginia); Sam Rubin (University of Virginia); Joshua Bogdanor (University of Virginia); Zhenyu Guo (University of Virginia); Yacov Haimes (University of Virginia)

**3:15 PM - 4:30 PM**

**DTA: STATISTICAL MODELING**

Process Modeling & Data Analytics Track

Room: Zehmer Lounge

Chairs: Larry Bonczar (University of Virginia), Vince Pulido (University of Virginia)

3:15 *Forecasting Mobile Transmission Reliability Using Crowd-Sourced Cellular Coverage Data*<sup>544</sup>

Michelle Martin (University of Virginia); Anne Kwan (University of Virginia); Eric Forte (University of Virginia); Fenjun Zhang (University of Virginia); Stephen Patek (University of Virginia)

3:40 *Empirical Analysis of Bayesian Kernel Methods for Modeling Count Data*<sup>54</sup>:

Molly Stam Floyd (University of Oklahoma); Hiba Baroud (University of Oklahoma); Kash Barker (University of Oklahoma)

4:05 *Improving Situational Awareness for Humanitarian Logistics Through Predictive Modeling*<sup>556</sup>

Mark Racette (University of Virginia); Christopher Smith (University of Virginia); Michael Cunningham (University of Virginia); Thomas Heekin (University of Virginia); Joseph Lemley (University of Virginia); Richard Mathieu (University of Virginia)