

Undergraduate Research Symposium May 17, 2013 Mary Gates Hall

Online Proceedings

SESSION 1Q

TOMORROW'S TECHNOLOGICAL SOLUTIONS AND APPROACHES FOR TODAY'S PROBLEMS

Session Moderator: Marc Dupuis, Computing and Software Systems

389 MGH

1:15 PM to 2:45 PM

* Note: Titles in order of presentation.

Designing Flight Deck Visualizations through Human-Centered Design Methodology

*Erin Margaret Murphy, Senior, Design: Interaction Design
Mary Gates Scholar*

Mentor: Axel Roesler, Art

This project examines new visual representations for spatial and temporal work tasks in the commercial flight deck. Utilizing integrated map and timeline views, we are exploring an alternative design concept for programming and replanning flight routes with the flight management system. In the current design of the flight management systems, pilots must manage a set of input devices and paper printed flight plans to program the flight route using numeric way points and time markers. Rerouting due to weather or inflight emergencies requires verbal coordination with air traffic control and the flight company. A new integrated interaction design approach to these interface operations could potentially lower the cognitive overhead required for these workflows and provide pilots with a better contextual understanding of their situation. When provided with clear information on the context of the plane and status of the mission, pilots can make better decisions during replanning and emergency scenarios. The presented research applies a human-centered design approach to the commercial flight deck and flight information displays that supports the interactions between pilots and the aircraft. Extensive video prototyping examines new directions for possible flight plan representations.

SESSION 2N

MCNAIR SESSION - IMPROVING LIVES VIA ENGINEERING, NEUROSCIENCE, EVOLUTIONARY BIOLOGY, AND PSYCHOLOGY

*Session Moderator: Gene Kim, Education, Office of
Minority Affairs & Diversity*

287 MGH

3:45 PM to 5:15 PM

* Note: Titles in order of presentation.

Origami Based Sustainable Packaging Design

*Alma Emadi, Senior, Industrial Engineering, Mathematics
EIP Scholar, McNair Scholar*

Mentor: Magnus Feil, School of Art/Division of Design

Packaging and the products associated with it produce millions of tons of waste every year - over 70 million tons in the U.S. alone in 2009. About 40% of this waste is recycled or reused, but the other 60% winds up in the landfill. According to the EPA, reducing packaging waste by only 25% would reduce carbon dioxide emissions by 20-50 million metric tons (MMT CO_2) per year. This among many other benefits is equal to reducing the environmental harms of 216,000 passenger cars not driven for one year. This study investigated sustainable packaging solutions derived from traditional origami designs and asks the questions: can these designs reduce environmental waste and is origami design widely feasible based on current market needs for reliability of packaging and associated costs? To do this, I designed an origami-based packaging solution for emergency aid packages containing food, water and survival supplies. I used the resulting design to assess at the product's life cycle, affectability and its aftermath. What happens to a product after its life is just as important a design consideration as its lifetime requirements and attributes. The results of this research show that sustainability does not have to be expensive and complicated. Rather it can be achieved through simple design and creative considerations.