Program

7:30 - 8:30   Registration/Continental Breakfast - Sponsored by Wyle

8:30 - 9:30   Keynote Address - Glenn Harrington, Ford Motor Company
                     Technical Expert - Assembly Ergonomics

9:30 - 10:30   Session 1: Education & Healthcare (Chair - Muddimer)
                     - Jupe, Rimkus Consulting,
                     Excessive Speed vs. Right of Way, drivers perceptual limitations to judge oncoming traffic
                     - Mehta, Peres, Pickens, Benden, Ory, TAMU, Ergonomics for the future workforce, or are we too late??!
                     - Shortz, Mehta, Benden, TAMU, Stand Up for Learning
                     - Dixon, Human Interfaces, Back to Basics: Building a Research Story

10:30 - 10:45   Lightning Session A (Chair - Parker)
10:45 - 11:00   Coffee Break Sponsored by <Your Company>
11:00 - 11:30   Poster Session A (Chair - Parker)

11:30 - 12:30   Session 2: Displays (Chair - Thronesbery)
                     - Ritchey, Mehta, Peres, TAMU, Validation of a New Self-Report Ergonomic Assessment Tool (SEAT)
                     Using Surface Electromyography, Near-Infrared Spectroscopy, and Video Data
                     - Meingast, HP Enterprise, Kruithof, Intel,
                     Lessons Learned from Conducting Usability Research within an Open Source Community
                     - Avera, UHCL, Harper, Russi-Vigoya, Stoll, HP,
                     Effects of Touchpad Size on Pointing and Gestural Input Area and Performance
                     - Chodapaneedi, T., Illori, A., Sibbadi, B., Allam, V., Gandi, R., Li, Y., Craig, B., Lamar Univ.,
                     Order Input Interface for People with Speech and Hearing Impairment at a Drive-Thru

12:30 - 1:30   Lunch Sponsored by <Your Company>

1:30 - 2:00   Interactive Panel Presentation: Expect the unexpected: Conducting research in challenging environments -
                     Greene, Holden, Meingast, Smith, Mehta

2:00 - 2:15	Coffee Break Sponsored by \<Your Company\>

2:15 - 3:15   Session 3: Space (Chair - Holden)
                     - Kitmanyen, HFES FL Space Coast (ERAU), Designing a Mobile Space Habitat Analog
                     - Thronesbery, SKGS, Malin, NASA (retired), Throop, Boeing,
                     Supporting Threat Assessment Using Empirical Data from Multiple Data Bases
                     - Miller, Wyle, Witt, Lockheed Martin,
                     Overview of NASA/SP-2015-3709, Human Systems Integration (HSI) Practitioner's Guide
                     - Flores, U of H Space Arch, A Method of Training Crews for Partial Gravity with Simplified Equipment.

3:15 - 3:30   Lightning Session B (Chair - Harper)
3:30 - 3:45   Coffee Break Sponsored by \<Your Company\>
3:45 - 4:15   Poster Session B (Chair - Harper)

4:15 - 5:15   Session 4: Complex Systems (Chair - Major)
                     - Sasangohar, TAMU, Systematic Management of Interruptions to Nurses in an Intensive Care Unit
                     - Neilson, Klein, Reine, Texas Tech,
                     Evaluating carry over effects of sideways camera rotations in the laparoscopic training environment
                     - Scharing, ABB, What are the elements that should be taken into consideration in the design and implementation of modern automation systems in a control room?
                     - Acton, Bradbeer, Lelos, Maynard, ERM, Human Factors in Emergency Response Planning and Management

5:15 - 7:00   Awards Ceremony and Reception (Chair - Parker)
                     Best Student Paper Award sponsored by Anonymous
                     Best Paper Award sponsored by Lockheed Martin
                     Best Student Poster Award sponsored by Lockheed Martin
                     Best Poster Award sponsored by Lockheed Martin

Posters
Session A
- 18 posters

1. Collier ERAU
PX3's Bite Regulator Technology

2. Melo Silva Federal Univ of Itajub
Application of agent-based simulation on the learning process of healthcare professional users

3. Russi-Vigoya, Bartha, HP
Sound Feedback Research for today devices

4. Vanukura, R., Kandakatla, J., Konidhina, M., Satti, S., Penumatsa, S., Li, Y., Craig, B., Lamar Univ.
Resume Search with Multiple Key-Words of Job Requirement

5. Ilori, A., Li., Y., Mahesh, V., Li, G., Craig, B., Lamar Univ.
Effect of Position: An Ergonomics Evaluation of Police's Wearable Equipment.

6. Patil, N., Kethineedi, S., Dabiran, Y., Saiprem, P., Li, G., Li, Y., Craig, B., Lamar Univ.
Evaluation of User Experience in Different Instant Messaging

7. Clark, Brainard, Salazar, Schwing, Lockheed-Martin, Hannifen, Thomas Jefferson University
Computational Modeling to Limit the Impact Displays and Indicator Lights Have on Habitable Volume
Operational Lighting Constraints.

8. Srivastava, Mehta TAMU
Developing a Fatigue Measure for Offshore Oil and Gas Operators

9. Shortz, Mehta TAMU
The effect of cognitive fatigue on worker perception, task performance, and neural cost

10. Bridges, Benden, TAMU
Evaluation of an ergonomic desktop software

11. Ritchey, Johnson, Batarse, Peres, TAMU
How Symbol Design Affects Compliance To Warnings In Industrial Written Procedures

12. Sharma, Benden TAMU
The use of a computer software as a behavioral intervention to increase and sustain sit-stand desk usage

13. Widlus, Jones, Texas Tech
Steps toward an Intention Prediction System for Assistive Robots

14. Braly, DeLucia, Texas Tech
Can Training Improve Collision Judgments?

15. Armstrong, Jones, Texas Tech, Schmidlin, Sony Computer Entertainment America,
Robots to the Rescue: Tele-Operator Training for Urban Search and Rescue

16. Levulis, Schumacher, Texas Tech
The Relationship between State-wide Handheld Cell Phone Bans and Fatal Motor Vehicle Accident Rates: An
Epidemiological Study Using Hierarchical Linear Modelling

17. DeLeon, Kelling, UHCL
Comparing Differences in Near Transfer of Virtual Training on Consumer Quadcopter Drone Flight

18. Avera, DeLeon, Sutherland, UHCL, Sun, Harteveld, Northeastern University
The Best Predictor of Future Reliance is Past Reliance

Posters
Session B
- 17 posters

20. Collier ERAU
Physiological effects of using PX3 Bite Regulators while sleeping, training and in competition in the prevention of concussions and traumatic brain injury among NCAA Division I Athletes.

21. Boykin HFES Alamo Chapter
An Overview of Army Research Laboratory ' Army Medical Department Field Element Research

22. Russi-Vigoya HP
Evaluating HP Sprout as an Aid in Participatory Design Research

23. Mahesh, V., Li, G., Li, Y., Craig, B., Lamar Univ.
Effect of Flooring on Lower Extremity Discomfort and Fatigue during Food Service Tray-line Jobs

24. Illori, A., Li, G., Li, Y., Zhang, J., Craig, B., Lamar Univ.
Effects of Category Wording and Color Contrasts on the Usability of a Library Website in a Language-Diverse Institution

25. Dabiran, Y., Navuluri, S., Piya, S., Li, Y., Craig, B. , Lamar Univ.
Music Ergonomics: A Study on Violin/Viola Shoulder Rest

26. Levy, Dundar, Tremmel, Old Dominion University
B.E.L.A.: Brain-computer-interface for Entertainment and Language Assistant

27. Rodriguez Paras, Mehta, TAMU
fNIRS Applications in Human Factors and Ergonomics

28. You, Pickens, TAMU
How to Prevent Low Back Injuries from Manual Lifting Tasks: A Study of Kinect Motion Capture System with Markers.

29. Tippey, Mack, TAMU
Weather Alerts within General Aviation

30. Hoyle, Peres, TAMU
The Usability of a Procedure Writing Tool for High Risk Work Environments

31. Sasangohar TAMU
Interruption Recovery in Supervisory-level Command and Control

32. Lodinger, DeLucia, Texas Tech
Interruptions in laparoscopic surgery: Does camera view influence resumption lag?

33. Neilson, Klein, Reine, Bukowski, Priestly, Texas Tech
Aquatic Nature Images and Green Nature Image Result in Different Perceived Restorativeness Ratings

34. Harris Texas Tech
Tau Attunement Training for Accurate Flare Initiation Timing

35. Flores U of H Space Architecture
Why Ramps Should be Avoided in Partial Gravity Environments Like Mars or the Moon.

36. Vazquez Klisans, Kelling, Barajas Barragan, DeLeon, UHCL
Investigation of Gamification within an Online Undergraduate Statistics Course

Abstracts

Keynote Address - Glenn Harrington, Ford Motor Company
Technical Expert - Assembly Ergonomics

Glenn Harrington is a Technical Expert and Supervisor of the North American Assembly Ergonomics Team at Ford Motor Company based in Dearborn, Michigan. He is a CPE and a Certified Six Sigma Blackbelt with an undergraduate BSc degree in Kinesiology and an MBA. He has been working in the field of Ergonomics for the past 30 years. His team at Ford works in the area of Advanced Manufacturing and has the responsibility for the up-front ergonomic assessment of all new parts, processes and workstations to be used to build the future model vehicles. His team is currently completing ergonomic assessments on the new 2018 F-150 and Expedition, 2019 Escape, 2020 Explorer and 2021 Lincoln MKX. He also leads a team at Ford responsible for developing assembly ergonomic design specifications for the 1,000s of parts used in the production of vehicles each day.

Session 1: Education & Healthcare (Chair - Muddimer)

Jupe, Rimkus Consulting, Excessive Speed vs. Right of Way, drivers perceptual limitations to judge oncoming traffic
Crossing, turning, or merging maneuvers into lanes of traffic are among the most common tasks that drivers undertake. This task involves detecting other vehicles and determining whether the planned maneuver is likely to create a conflict. In the case of a turning maneuver, the oncoming vehicle must be identified and likely the vehicle may be so far away that their speed cannot be determined with any accuracy. Often, if familiar with the location, a driver will rely on prior experience when determining the speed of the oncoming vehicle. This prior experience works well, as long as the oncoming vehicle is in reasonable compliance with expectations. When the oncoming vehicle is not in compliance with expectations problems can arise. The greater the noncompliance the more rare the event becomes and the more the risk increases. The presentation will discuss the relevant Human Factors research as it applies to a driver ability to accurately judge the time available to execute a traffic crossing maneuver. Additionally, the presentation will discuss a scenario in which the turning motorist may owe a legal duty to yield the right-of-way to an oncoming vehicle but may lack the perpetual capabilities to correctly access the situation and grant the right-of-way given the speed of the oncoming vehicle.;

Mehta, Peres, Pickens, Benden, Ory, TAMU, Ergonomics for the future workforce, or are we too late??!
Increasing technology dependence is a growing ergonomic concern particularly among college students who rely on their smartphones, laptops, tablets, and other computing devices for school, work, and recreational activities. While the benefits with the growth of technology usage are imperative for our economy, parallel efforts in improving knowledge on health risks, associated behavior, and ultimate outcomes (such as pain and disability) with our daily interactions with technology are extremely insufficient. Employers in the energy sectors claim that 42% of their new hires begin work with a preexisting health issue related to the use of technology. Ergonomic guidelines are necessary that deliver the highest quality education on health risks with use of technology to college students (who are the next gen workforce) that over time will help reduce future workplace injury costs associated with the use of technology. This presentation will discuss ergonomic risk behaviors linked to the interaction with technology among 552 geoscience college students. Key findings include: 1) 91-93% students used smartphones and laptops, and smartphone usage exceeded 3.5 hours/day, 2) 34% students lacked knowledge regarding ergonomic risks with technology, 3) 39-42% students reported recurrent eyes, neck, and low back pain/discomfort, and 4) 75% students felt the absence of ergonomic culture in the College of Geosciences. Additionally, principal components analysis on full body postures with the use of technology identified key postural themes that may further exacerbate the aforementioned risk behaviors. Findings obtained here, along with current research efforts at the Texas A&M Ergonomics Center, may facilitate development of policy proposals that attempt to formulate 'smart' health standards in institutions/workplaces, inspire ergonomically-sound built learning environments, and design of ergonomic tech accessories.

Shortz, Mehta, Benden,TAMU, Stand Up for Learning
The prevalence of childhood obesity has grown at a significant rate over the past three decades, with approximately 16.9% of children aged 2-19 classified as obese and an alarming 31.8% classified as overweight. Previous in-school interventions have focused primarily on nutrition and physical activity. However, in recent years dynamic classrooms that utilize stand-biased desks and other movement friendly furniture has shown to be effective and efficient interventions to combat sedentary behavior in schools worldwide. However, the impact on cognitive outcomes overtime has not been extensively investigated. The purpose of this pilot study was to determine the neurocognitive benefits, in terms of executive function and working memory, of stand-biased desk and associated neural activity changes in the prefrontal cortex in high school freshman. 34 students were enrolled in neurocognitive testing during two time periods: 1) fall semester and 2) spring semester (after 27.57(1.63) weeks of continued exposure). Working memory and executive functions were tested using a computerized neurocognitive test battery and neural activity was assessed using functional near infrared spectroscopy, a neuroimaging technique. Results indicated that continued utilization of stand-biased desks was associated with significant improvements in working memory and executive functions (~7-14% improvement) with associated changes in corresponding neural activity of the left frontal lobe. The findings from this pilot study provide the first preliminary evidence for neurocognitive benefits of standing desks.

Dixon, Human Interfaces, Back to Basics: Building a Research Story
Conducting user experience research has increasingly become an accepted and expected part of the development process among firms, from those building consumer websites to enterprise applications. While this trend of incorporating research has the potential of leading to data driven solutions and positive outcomes, all too often it means that user research becomes a box-checking activity. In such cases, a lack of clear focus on sound fundamentals leads to research that fails to deliver on the promise of insights and impact that can positively shape both the strategy and tactical implementations of products and interfaces. In this presentation, we will explore how a Story-based approach to research can help organizations avoid the pitfalls of poor research design, execution and communication of results. This presentation will first highlight trends in the landscape of user research which tend to lead to a lack of focus, or Story, such as: A faster research cadence, an expansion of scope beyond traditional human factors and usability questions, and a trend towards 'lean UX', where more stakeholders are involved in and/or conducting research as a secondary part of their job responsibilities. With an understanding of such trends, this presentation will then highlight common pitfalls to sound research in industry, such as ill-defined research objectives, use of methods which are sub-optimal or inappropriate for the research questions, and a lack of focus in analysis and reporting which can lead to results that may be unpalatable or unfeasible for businesses and can lack clear direction and actionable recommendations. Finally, this presentation will articulate how a focus on a Research Story can avoid many of these common pitfalls, helping practitioners to better define meaningful research questions, gain greater stakeholder buy-in of the process, use methods which better match research and business objectives, and can ultimately increase the relevancy of research results and how those results are communicated.

Session 2: Displays (Chair - Thronesbery)

Ritchey, Mehta, Peres, TAMU, Validation of a New Self-Report Ergonomic Assessment Tool (SEAT) Using Surface Electromyography, Near-Infrared Spectroscopy, and Video Data

Despite the considerable advances in the practice of office ergonomics, office workers are still suffering from musculoskeletal disorders (MSDs). These disorders, like carpal tunnel syndrome, can lead to high medical costs for employers and intense pain and discomfort for employees. It is our hypothesis that the design of the software that office workers use is a contributing factor to their risk of developing MSDs. The study presented here is a continuing effort, and a collaboration with industry sponsors, to develop a self-report ergonomic assessment tool (SEAT) that is able to assess ergonomic risks associated with the design of software, or in other words, the way in which users are required to interact with software. The SEAT is also being designed to be sensitive enough for evaluating ergonomic risks as they vary across several electronic devices (e.g., desktops, notebooks, tablets, smartphones) that are used in office environments. Using previously collected video data, we will compare participants' responses to the stress components of the SEAT, like wrist flexion/extension and ulnar/radial deviation, to determine if people are able to accurately self-report these types of risk factors. A new experiment will have participants complete different tasks across several electronic devices while physiological measurements are recorded in order to validate their self-reported strain. Participants' strain will be measured using surface electromyography (sEMG; as a measure of muscle activity) and near infrared spectroscopy (NIRS; as a measure of muscle oxygenation) serving as correlates of injury risk.

Meingast, HP Enterprise, Kruithof, Intel, Lessons Learned from Conducting Usability Research within an Open Source Community

Open source communities such as OpenStack are a growing component of the enterprise environment. Many companies, including Hewlett Packard Enterprise, Intel, Rack Space, and even organizations such as NASA, have made a significant investment in OpenStack. However, conducting user research within an open source environment presents some unique challenges. Many of the standardized processes and controls that are part of classic user research, from both screening technique to methodologies, are unrealistic when working with the Community. Further, the Community lacks the hierarchical management structure that most corporations have, which can help teams come to decisions more quickly, and provide deadlines that can force action. While collaboration across organizations can broaden perspectives and insights, it also means that there is often not an owner who is accountable for taking action in response to an identified challenge. This presentation presents an overview of some of the challenges involved with working within open source communities, which can be extended to many unique research environments, as well as some of the approaches we have arrived at, through trial and error, that have helped us to succeed when conducting research within this environment. These include keeping ad hoc user experience teams small and focused, with individuals that are willing to contribute, utilizing collaboration tools such as Invision to drive and track active participation, and automating as much as possible.

Avera, UHCL, Harper, Russi-Vigoya, Stoll, HP, Effects of Touchpad Size on Pointing and Gestural Input Area and Performance

With the introduction of gestural input, many laptops are now being designed with larger touchpads in order to allow for the most accurate use of these features. Vendors have recommended surface input area sizes ranging from 60mm (w) x 45mm (h) to 105mm (w) x 65mm(h) and larger. However, as touchpads have continued to grow, it has been discovered that large touchpads can sometimes cause usability issues from unintended activation of gestures. From observing users over time we have noticed that people tend to focus input in the center area of the touchpad, regardless of touchpad dimensions. Therefore it is questionable whether continuing to increase the size of touchpads is necessary. To answer this question we have conducted a study using two touchpads with the same surface materials, one with the dimensions of 140mm (w) x 65mm (h) and one with the dimensions of 95mm (w) x 63mm (h). We found that increased touchpad size did not have a significant effect on the input area that people used for pointing or gestural input. Additionally, we discovered that size did not have an effect on performance or error rates.

Chodapaneedi, T., Illori, A., Sibbadi, B., Allam, V., Gandi, R., Li, Y., Craig, B. , Lamar Univ., Order Input Interface for People with Speech and Hearing Impairment at a Drive-Thru

Order Input Interface for People with Speech and Hearing Impairment at a Drive-Thru Introduction A great majority of the drive-thrus in the United States and around the world have only one user interface to place orders ' a simple speak over system where the customers, using a microphone placed near the menu board at the drive way, speak to one of the employees of the restaurant and place their orders. This interface cannot be used by people with speech and hearing impairment, who are often forced to go into the restaurant to place the orders or use other forms of communication such as writing on a paper in order to communicate their order to the employee. Few businesses such as Subway have installed touchscreen kiosks in some of its restaurants, but it is not seen as an interface that could be installed across all the drive-thrus as it requires a lot of investment on the restaurant-chains' part. This project aims to develop a low cost, ATM-styled keypad based input interface that would help people with speech and hearing impairment place orders more efficiently. Methodology The input interface is designed to be ergonomically accessible and easily understood by everyone by having a simple 0-9 numeric keypad. For experiment purpose, this interface will be compared with another two systems ' one that utilizes the conventional speaker ordering and another that uses a touch screen interface. Two identified independent variables are 'order input mechanism' and 'feedback interface'. In the experiment task, each participant will be required to place an order using all 3 systems. In alignment with the research goals, participants will be users with some form of speech/hearing impairment and those with English language deficiencies. Dependent variables are order completion time and success rate. Participants will also be required to fill subjective questionnaires which would measure user-friendliness. Results and Conclusion Expected results should show significant differences in time it takes a prospective user to pull up to a drive thru and complete an order. This would be evident in the fact that a speech/hearing impaired individual can order from a drive thru like everyone else rather than have to walk into the restaurant. Also, it will reduce the long awkward clarifications between an attendant and a customer that occurs due to language barriers. Due to the moderate pricing in design and development, this intervention can be easily implemented in franchise locations that are otherwise unable to afford high-tech support tools for the target users.

Interactive Panel Presentation: Expect the unexpected: Conducting research in challenging environments
 - Greene, Holden, Meingast, Smith, Mehta

Human factors professionals strive to make research and evaluation activities as efficient and controlled as possible, but many times conducting an activity in the sterile lab environment is not an option. Many researchers must conduct studies under unusual or challenging environmental conditions, due to the need for high ecological validity (in situ/field), or affordability (e.g. online testing). These projects present many challenges, which may include lack of access to resources, and indirect contact with subjects. Sleuthing and detective work are often needed to understand anomalies that appear in the data. Why is the error rate unusually high? Why are response times so fast/slow? What cultural differences do you need to be aware of? What are subjects not telling you? Conducting studies outside the lab is becoming more prevalent with advances in technology, and these kinds of issues are becoming more widespread. The purpose of this discussion panel is to provide a forum for lessons learned, approaches, and advice to future researchers. The members of this panel come from a variety of backgrounds, and have all conducted testing in uncontrolled conditions such as spaceflight, foreign countries, offshore oil rigs, and online. The panel will be composed of professionals from several domains, including: Maya Greene (Wyle, at NASA JSC), Melissa Meingast (Hewlett-Packard), Danielle Smith (Express Scripts), and Ranjana Mehta (Texas A&M University). Kritina Holden (Lockheed Martin, at NASA JSC) will serve as the chair and provide an overview, followed by each of the panel members speaking for 5-7 minutes. There will be time for questions and discussion at the end.

Session 3: Space (Chair - Holden)

Kitmanyen, HFES FL Space Coast (ERAU), Designing a Mobile Space Habitat Analog
With the space industry's growing focus on going to Mars, proper crew selection has become a major area of concern in planning this kind of long-duration space mission. The crew selection process has previously been straightforward with preference towards specific types of personalities, skills, and backgrounds. However, this new endeavor presents a more unique problem: a Mars mission will involve a crew of four to six astronauts confined to a single spacecraft for upwards of eight months on their way the red planet. Crewmembers will be at risk for behavioral health decrements as they face confinement, isolation, and boredom over a long period of time, which may significantly impact team dynamics, team performance, and/or the success of the mission. And that is just considering the initial transit portion. In response to these imminent issues, researchers use analog facilities to simulate various aspects of space exploration in order to study psychosocial factors. The Mars Desert Research Station (MDRS) in Utah, the Aquarius Reef Base Facility at Key Largo, the Human Exploration Research Analog (HERA) at Johnson Space Center, and the Hawaii Space Exploration Analog & Simulation (HI-SEAS) on the slopes of the Mauna Loa volcano are just some examples of the facilities currently in operation. Recently, students and faculty at Embry-Riddle Aeronautical University have been designing and developing a new kind of space analog, the Mobile Extreme Environment Research Station (MEERS). Compared to other analogs, MEERS is unique in that it will be capable of being transported cross-country to wherever it is needed for research. This transportable test-bed is currently being designed with emphasis in dual-use architecture for each of its functional areas, allowing for multi-modal, mission-specific flexibility in terms of its layout and uses. This station will ultimately simulate a small-team space habitat in which a team of two to six crewmembers will be able to live in for up to two weeks and conduct experiments fully self-sustained in a remote area. The purpose of this paper is to demonstrate the relevance and benefits of MEERS as a mobile analog facility, and shed light on its extent of potential research applications.

Thronesbery, SKGS, Malin, NASA (retired), Throop, Boeing, Supporting Threat Assessment Using Empirical Data from Multiple Data Bases
A pilot software solution was developed for the NASA Engineering and Safety Council (NESC) to assist with risk assessment for the International Space Station. The primary objective was to ease the investigation of incidents to assess whether they represent a larger, developing threat. Difficulties faced by the discipline experts who investigate such threats include a multitude of problem reporting data bases located at multiple centers and constructed for different users and purposes. There was an abundance of information that was theoretically available, yet it was difficult to access in order to assess threats. Tools available to the project included a well-respected commercial data visualization tool, the ability to parse short problem descriptions and tag with concepts from an Aerospace Ontology, and manually entered data base codes describing things like causes, failures, and defects. Challenges included the lack of consistency across data bases of the data fields for each record (cause, failure, defects) and the specific, manually entered codes for the levels in each of the data fields. We identified multiple ways in which the data is used to assess threats and constructed a concept of operations and scenarios illustrating how users would like to make use of a combined data views of the multiple problem-oriented data bases. These use cases were based on discussions with users who made use of some of the component data bases to investigate specific issues. We were tasked to investigate how to assist searches, but found that it was equally important to support the reporting of incidents. Through an investigation of relevant literature and from specific practices of our users, we have composed recommendations for supporting the reporting and search of problem incidents to support threat assessment. These recommendations were prepared for the NESC, but are widely applicable to many uses of data base information to support the use of empirical information relevant to operational decisions.

Miller, Wyle, Witt, Lockheed Martin, Overview of NASA/SP-2015-3709, Human Systems Integration (HSI) Practitioner's Guide
The NASA/SP-2015-3709, Human Systems Integration (HSI) Practitioner's Guide, also known as the "HSIPG," provides a tool for implementing HSI activities within the NASA systems engineering framework. The HSIPG is written to aid the HSI practitioner engaged in a program or project (P/P), and serves as a knowledge base to allow the practitioner to step into an HSI lead or team member role for NASA missions. Additionally, the HSIPG is written to address the role of HSI in the P/P management and systems engineering communities and aid their understanding of the value added by incorporating good HSI practices into their programs and projects. HSI has been successfully adopted (and adapted) by several federal agencies-most notably the U.S. Department of Defense (DoD) and the Nuclear Regulatory Commission (NRC)-as a Methodology for reducing system life cycle costs (LCCs). Cost savings manifest themselves due to reductions in required numbers of personnel, the practice of human-centered design, decreased reliance on specialized skills for operations, shortened training time, efficient logistics and maintenance, and fewer safety-related risks and mishaps due to unintended human/system interactions. The instructions and processes identified are best used as a starting point for implementing human-centered system concepts and designs across programs and projects of varying types, including manned and unmanned, human spaceflight, aviation, robotics, and environmental science missions. The HSIPG provides an "HSI layer" to the NASA Systems Engineering Engine (SEE), detailed in NASA Procedural Requirement (NPR) 7123.1B, NASA Systems Engineering Processes and Requirements, and further explained in NASA/SP-2007-6105, Systems Engineering Handbook.

Flores, U of H Space Architecture, A Method of Training Crews for Partial Gravity with Simplified Equipment.
Of course the crew should be trained and NASA does extensive task based training but there should also be movement based training to develop procedural memory which is often referred to as 'muscle memory'. One of the advantages of developing procedural memory is that task performed using procedural memory do not require conscious thought thus other task can be accomplished at the same time. Examples of this are walking and changing directions which will be different on Mars and the Moon. The current method used to date is to try and un-weight the person either using some method of hoisting or parabolic flight. These methods are expensive and restrict the amount of time and type of movement that is possible. My proposed way to do this training is to provide crew members with footwear with the proper coefficient of friction for the training room floor and have them perform test maneuvers. The first step is to determine typical coefficients of friction of common flooring types and then reduce them by the corresponding factor to simulate the effect of moving in a partial gravity environment. This study looks at these the partial gravity levels of mars and the Moon and proposes the correct coefficient for this training and also any additional equipment that might be required.

Session 4: Complex Systems (Chair - Major)

Sasangohar, TAMU, Systematic Management of Interruptions to Nurses in an Intensive Care Unit
In a previous observational study of a Canadian Intensive Care Unit (ICU) we found that nurses consider the severity of the task-at-hand to regulate their interruptions to other nurses. However, these tasks were not immediately visible to other nurses. We evaluated a technological mitigation called task-severity awareness tool (TAT) for nurses to inform others when they are performing high-severity tasks. The tool includes a series of button that engage a display outside the ICU room. Nurses can engage the display when they perform a high-severity task. TAT was installed in a Cardiovascular ICU room at a Canadian hospital. Fifteen nurses assigned to the TAT room and 13 nurses assigned to 11 other rooms were observed, approximately 2 hours each, over a 3-week period. The results showed that the Interruption rate during high-severity tasks in the TAT room was significantly lower than in other rooms. In addition, the interruptions with personal content were entirely mitigated during high-severity tasks. Further, interruptions from nurses and MDs were also entirely mitigated during high-severity tasks but happened more frequently during non-high-severity tasks compared to rooms with no TAT.

Neilson, Klein, Reine, Texas Tech, Evaluating carry over effects of sideways camera rotations in the laparoscopic training environment
Laparoscopic surgery has significant advantages to patients but poses several challenges to surgeons. Some challenges are loss of binocular depth cues and increase in visual-motor distortions with laparoscope rotations (Reinhardt-Rutlan, Annett, & Gifford, 1999). Previous research has attempted to identify critical rotation angles where the visual-motor distortion produces worst performance with sideways camera rotations (Ames et al., 2006; Cunningham, 1989; Klein, Wheeler, & Craig, 2005). Furthermore, Abeele & Bock (2001) theorized that the critical angle shifts when participants are performing a task at one sideways camera rotation and then change the sideways camera rotation by 45'. More specifically, their findings suggest that the critical angle shifts dependent upon the change in the sideways camera rotation being an increasing 45' rotation (critical angle range: 105'-150') or a decreasing 45' rotation (critical angle range: 75'-120'). The goal of the present study was to determine if the results found in Abeele & Bock (2001), specifically with regard to the critical angle ranges, generalized to 3D, laparoscopic surgery training task. Towards that end, we conducted two studies; Study 1 assessed between-group differences in performance at different camera rotations, and Study 2 assessed within-person differences in performance at different camera rotations between two conditions (increasing and decreasing rotations). For the first study, we randomly assigned 96 novices to 8 conditions (45' first, 90' second; 75' first, 120' second; 105' first, 150' second; 135' first, 180' second; 90' first, 45' second; 120' first, 75' second; 150' first, 105' second; 180' first, 135' second). For the second study, we randomly assigned 28 novices to 2 conditions (progressively increasing by 10' starting at 0'; progressively decreasing by 10' starting at 180'). Performance on the laparoscopic training task was measured the same for both studies using movement time (ms) to make initial transfer, average movement time (ms) to make a transfer, and an accuracy measure (total drops/total transfers). The significant differences and effect sizes of our two studies on all dependent measures suggested a larger critical angle range for increasing rotations (critical angle range: after 120') but were consistent with Abeele & Bock's (2001) findings for decreasing rotations (critical angle range: 75'-120'). Therefore, training novices using a laparoscopic task should provide extra training within these critical angles. Future research needs to determine if surgeons experience different critical thresholds than novices, which would be important for continued laparoscopic training throughout one's surgical career.

Scharing, ABB, What are the elements that should be taken into consideration in the design and implementation of modern automation systems in a control room?
Modern history is full of breakthroughs in technology, all striving to increase productivity and efficiency. What are the elements that should be taken into consideration in the design and implementation of modern automation systems in a control room? Both industry and international standards are now demanding that Human Factors be considered as part of the design of control rooms, to maximize efficiency and minimize the potential of human error, which can lead to downtime, and a loss of profit as a result of interruptions in production. We will examine how these new standards are helping to address these challenges that are facing the up, mid and downstream industries today ' combined with an increased focus on operator health, and how an intelligent and ergonomic workspace can both mitigate risk and optimize production. Optimization is money. We will discuss examples of how to apply technology and innovative control room planning to maximize production and minimize risks that can impact overall production and profit.

Acton, Bradbeer, Lelos, Maynard, ERM, Human Factors in Emergency Response Planning and Management
Although multiple barriers and controls are built into safety critical environments, dangerous accidents still happen every year. Many industries have need of well thought out emergency response planning and management as a result of their hazardous environments. For example, an offshore oil production platform is required by regulation to have a plan to safety and quickly evacuate the facility if a major accident were to occur. These plans include designated escape routes, temporary refuges, and alternate incident command centers among other details. Applying Human Factors principles can improve many facets of emergency planning and management. Four main areas are: ' Emergency procedures development, ' Modeling of response times, ' Design of buildings and escape routes, ' Training. Emergency Procedures should be developed using best practices to ensure proper communication, chain of command, and instructions on when to muster or evacuate the facility. Modeling software can be used to estimate time to travel to the temporary refuge and determine where bottleneck could occur. Human Factors principles can be applied when designing the alternate incident command center to ensure proper flow and function. Boarding the lifeboats and mustering are two parts of the plan that need frequent training where Human Factors could also be applied. This paper will explore these aspects of the planning and management process where Human Factors can play a significant role.

Posters - Session A 1-18

1. Collier ERAU
PX3's Bite Regulator Technology
This study will investigate whether enhanced respiratory, skeletal, physiological and neurological benefits offered by PX3's new bite regulator technology represent key variables in reducing concussions among NCAA Division I athletes. We expect to see an increase in physiological performance and a subsequent greater decrease in concussions in subjects using the PX3 Bite Regulator compared to same-sport athletes using traditional mouthguards or no mouthwear over the same time period.

2. Melo Silva Federal Univ of Itajub
Application of agent-based simulation on the learning process of healthcare professional users
 The growing use of the technology applied to Medicine has an immediate impact on patient care. This growth is connected to alterations, updates, and new complex projects of medical devices. In this sense, one of the most critical issues relevant to healthcare technology is directly related to human errors, which can cause damage and death of a patient. There are two kinds of approaches related to human error: the personal one that focus on individual mistakes, accusing them of forgetfulness, inattention, or moral weakness; and the system approach points out that focuses on the working condition of the people and try to create barriers to prevent errors or mitigate its effects. Aligned with this issue, some studies have proved that the learning in a risk free environment can be effective with the help of the simulation. Simulation is an important tool in professional training because it is possible to learn and recognize the various normal and abnormal situations of an interface from a technology, which can significantly contribute to increased patient safety. This type of learning, with the simulation of real situations, gives the user has the opportunity to instruct oneself doing, making mistakes and learning from their own mistakes. One healthcare environment, which represents one of these situations, rather complex and with various technologies, is a Neonatal Intensive Care Unit. In this environment, an infant incubator stands out as a support life equipment of a premature newborn, as it maintains a microclimate suitable to each patient. Considering the importance of controlling these conditions, the objective of this work is to mimic the control panel of an infant incubator that will be utilized for the apprenticeship of professional healthcare users with the use of agent-based simulation. To achieve this goal, we used the modeling and simulation research method. The steps to build the computer model were conceptualization, modeling and validation. The study object is the interface of an infant incubator that is in the Usability and Human Factors Lab for Medical Equipment at the Federal University of Itajub' (Brazil). The conceptualization phase investigated the main aspects involved in the usage of an infant incubator and which control variables are involved in the microclimate. In the second phase (modeling), the model was built on the AnyLogic software representing the control panel of the object of study. Finally, the model was tested by users who rated their applicability. For the model validation process we used a low-fidelity usability testing, in which users have tested the interface and answered questionnaires pre and post test. The users point it out that the tool facilitates the use of new technologies, accelerating the adaptation to new equipment, and foreknowledge of events and simulated tasks promotes the safe use of new technology, reducing the likelihood of errors. The agent-based simulation evidenced to be a suitable method that faithfully reproduced the interface of an infant incubator helping in the learning process of its users.

3. Russi-Vigoya, Bartha, HP
Sound Feedback Research for today devices
The length of feedback sounds, the pitch, and the level of the sound, play an important role in the user experience. There are many devices that convey information using sounds. This study aimed to investigate whether individuals are able to match sound with intended meaning. Eight of the existing sounds used to connect, disconnect, enter aux-in-mode, receive or reject an incoming call, max volume, and power on and off, were perceptually assessed through a survey with 80 respondents. Results showed that the sound of an incoming call is very much recognizable. Sounds for Power On, Power Off, and Rejecting Incoming call showed to cause confusion for the user. All other sounds did not elicit a strong interpretation. This study could help designers and product developers to create standards for sounds across the industry.

4. Vanukura, R., Kandakatla, J., Konidhina, M., Satti, S., Penumatsa, S., Li, Y., Craig, B., Lamar Univ.
Resume Search with Multiple Key-Words of Job Requirement
Resume Search with Multiple Key-Words of Job Requirement Introduction Recruitment refers to the overall process of attracting, selecting and appointing suitable candidates for jobs (either permanent or temporary) within an organization. Staffing companies in the U.S. employed an average of 3.0 million temporary and contract workers per week in 2013, up 4.0% from 2012, according to the quarterly ASA Staffing Employment and Sales Survey. The recruiter has to undergo in many ways like posting in job portals, contacting the approved vendors, through professional networking sites etc. The initial survey showed that most recruiters choose to work with preferred vendors or connections they have in their LinkedIn rather than searching through job portals since no assurance that candidate can come and join the project after interview. They get almost 300 to 400 resume per day as soon as they post the requirement and it is very difficult to find the best candidate in such a huge volume within a short period of time, said by Vissu, a recruiter from Business Intelli Solutions, Inc. This research aimed to develop a new application to help find the best resume in a huge volume with just a single click by giving a key word based on the job description. Methodology To use the application, the recruiter needs to enter the main keyword of required multiple tools and technologies needed for a job into the keyword box and upload the database of resume (single to multiple) and then click search. The application searches the whole database and displays only the perfectly matched resume. When the recruiter opens the displayed results, a new dialogue box with the resume and highlighted keywords will be displayed, so that the recruiter can easily evaluate a resume. It is also helpful for a hiring manager to evaluate and select a best resume for hiring process. The experiment will be performed with candidate resumes and a job requirement from Indeed. The application will be compared with the traditional methods. Completion time and workload will be measured. User comments will also be collected for design improvement. Results and Conclusion The survey of application with recruiters showed satisfactory results. It is expected that the experiment results will demonstrate the advantage of the proposed applications. This application is specifically designed for recruiters but it can also be used to search a huge book or files with multiple keywords. It can also be used to search the files not only by alphabets but also by numbers and symbols too.

5. Ilori, A., Li., Y., Mahesh, V., Li, G., Craig, B. Lamar Univ.
Effect of Position: An Ergonomics Evaluation of Police's Wearable Equipment
Effect of Position: An Ergonomics Evaluation of Police's Wearable Equipment Introduction Safety, communication and integrity are essential to police departments all over the world and all of these are evident in the appearance of an active duty police officer. From the bullet proof vest to carry-on such as gun holster, walkie-talkie and body cameras, one can tell there's very good reason for each piece of equipment found on a police officer. Although a number of studies have been conducted, little research has been conducted on the bodycam and walkie-talkie from an ergonomic perspective. Most studies concerning police bodycams and walkie-talkie focused only on the socio-economic impact of the device. This study seeks to evaluate the effect of the position of the body camera and walkie-talkie and provide preliminary design guidelines to future applications. Methodology Position of the equipment was manipulated as the independent variable in the study. Traditionally, the walkie-talkie is worn on the shoulder while the bodycam goes on the chest. This study considered alternative positioning and design (shoulder combined and chest combined configurations) for both devices. In the experiment, each participant was asked to run around a designated course, simulating a foot pursuit. The course had 6 turns and at each turn, participants were required to report a predetermined statement into the walkie-talkie device. To measure performance, task completion time was recorded during each trial. Discomfort surveys and the NASA TLX were also used to measure the participants' discomfort level and workload during each trial. As a preliminary study, six participants were recruited for the study. Two trials were conducted with each identified position and the six trials were completely randomized. The experiment lasted less than one hour. Results and Conclusion The results showed significant effect of position on both task completion time and workload. Participants spent significantly less time and significantly smaller workload when putting the combined equipment on the chest. All participants also reported lower discomfort level with the combined equipment on the chest, an effect that can be attributed to the fact that this position eliminates the awkward posture that occurs in the other two positions. In conclusion, a chest mounted configuration (that combined both devices) is recommended. This configuration led to lower task completion time and workload, presumably because this mounting position enabled officers to speak into their walkie-talkie while maintaining enough forward situational awareness to continue the pursuit. In contrast, shoulder mounted configurations are not recommended. They led to higher task completion time and workload because participants had to assume awkward postures while reporting into the walkie-talkie. In addition to improving police officer ergonomics, this proposed design can be applied across other industries that make use of wearable equipment for communication.

6. Patil, N., Kethineedi, S., Dabiran, Y., Saiprem, P., Li, G., Li, Y., Craig, B., Lamar Univ.
Evaluation of User Experience in Different Instant Messaging
Evaluation of User Experience in Different Instant Messaging Introduction Today's users are adopting a wide range of Instant Messaging (IM). It is noticeable that instead of focusing on one or two IMs, people's preferences of IMs are highly diverse. In this paper, the major objective was to explore the reasons behind this interesting phenomenon by conducting comparative work that examines the usability of different instant messaging applications. This comparison between different messengers allows drawing conclusions about how effectively different instant messaging applications can fulfill needs of different groups of users. Methodology A preliminary survey was conducted with a sample size of 50 participants to obtain their demographic information and subjective comments on the IMs they were using, such as the most used apps, the most impressive features, the least useful features and what needs to be improved. Based on the survey result, three most frequently used IMs were chosen: WeChat, WhatsApp and Facebook Messenger. Four tasks were selected to evaluate the usability of IMs: sending messages, sending photos, calling and blocking. An instruction was developed and training was provided for the participants to perform each task with the three IMs. As a preliminary study, three groups (5 in each group) of participants were employed for each IM and each group had no use experience with their assigned IM. In the experiment, the 4 tasks were randomly assigned to each participant. Dependent variables include task completion time, number of clicks, success rate and number of errors. It is important to point out that the time needed for delivery was not counted as part of task completion time since it depends on external internet speed. For example, the task completion time for sending a message is the duration between the starting point and the time the 'send' button is clicked. Subjective questionnaire were also used to assess participants' satisfaction level. Each experiment lasted less than 30 minutes. Results and Conclusion The experiment is still in progress. The current data has demonstrated some interesting but not conclusive findings: WeChat showed great advantage over WhatsApp and Facebook Messenger as it enables the participants to perform the tasks with less completion time and higher success rate because of its more user-friendly design. More specifically, WeChat uses more symbols rather than texts, and has more efficient user interface layout. More results will come out in the full paper when the experiment is finished. It is also expected that with a larger quantity of the empirical data, the study will end up with a set of design guidelines and should provide insights to the future applications.

7. Clark, Brainard, Salazar, Schwing, Lockheed-Martin, Hannifen, Thomas Jefferson University
Computational Modeling to Limit the Impact Displays and Indicator Lights Have on Habitable Volume Operational Lighting Constraints.
In late 2016, the lighting environment for the International Space Station will begin to be updated with a new lighting system. The Solid State Lighting Assembly (SSLA), a Light Emitting Diode (LED) technology, which is multi-spectral and intended as a lighting countermeasure to improve crewmember sleep, will replace the General Luminaire Assembly (GLA), a fluorescent based lighting technology. During the development of the SSLA, it was discovered that an LED indicator mounted in the fixture caused the SSLA to fail certain visible light spectrum tests. The problem was resolved via operational constraints on the LED indicator but the experience drove the development of this project. The goal of this investigation is to determine design limitations and architectural solutions that limit the impact light from displays and indicator lamps have on the operational environment task lighting and lighting countermeasure spectrum constraints. It is concerning that this innovative architectural lighting system, could be compromised by spectrums from display systems, architectural materials, and structures that are not considered as part a full system design implementation. Displays and indicators are a necessary part of the spacecraft and it is the goal of this research project to determine constraints and solutions that allow these systems to be integrated while minimizing how the lighting environment is modified by them. Due to the potentially broad scope of this endeavor, the project team developed constraints for the evaluation. The evaluation will be on a set of tasks that required significant exposure in the same environment while having a large chance of impacting the light spectrum the crew is expected to receive from the architectural lighting system. The team plans to use recent HRP research on 'Net Habitable Volume' [1] to provide the boundary conditions for volume size. A Zemax ' lighting model was developed and demonstrated a work surface illuminated at a high level by the overhead light source compared to displays and indicators whose light is parallel to the work plane. The overhead lighting oversaturated spectral contributions from the display and indicator at the task work surface. Interestingly, when the virtual sensor looks at the displays and LEDs within the small enclosure, their spectral contribution is significant but can be reduced by reflecting overhead light from the wall(s) to the observer. Direct observation of displays and LEDs are an issue because the user's viewing area is a display, not an illuminated work surface. Future Zemax models of an avionics command console environment within a volume large enough for both the command station and a sleep station will be developed. Additionally, requirements will be developed and a mockup fabricated to evaluate the findings of the model and attempt to provide limitations and solutions to mitigate unwanted light. Using a combination of computer modeling, and conventional lighting analysis, the goal of this team is to identify solutions including architecture, materials, equipment placement, light source placement, display and indicator colors, display size, indicator quantity and intensity, and technologies that keep unwanted spectrum from displays and indicators at a manageable level.

8. Srivastava, Mehta, TAMU
Developing a Fatigue Measure for Offshore Oil and Gas Operators
To improve workplace safety, increasingly industries are monitoring fatigue to prevent conditions that can induce injuries and accidents. Fatigue, attributed to work related factors, quality and quantity of sleep, and medical factors, can impede a worker's ability to achieve productiveness and also increase possibilities of errors. It is estimated that in the oil and gas operations during 2003-2010, about 4600 US workers died from work related injuries. Fatigue has also been recognized as a key reasons behind accidents. For example, investigation of BP Texas city refinery fatal explosion indicated that extended working period could have contributed towards the accident. This accident precipitated the adoption of fatigue management practices that serve as guidance to all stakeholders on understanding, recognizing, and managing fatigue in the workplace. However, one of the major barriers that currently impacts fatigue management is the lack of a comprehensive assessment of fatigue, which differs in the way it is defined and evaluated in different occupations and environments. Accordingly, numerous fatigue assessment methods are present but are not relevant to the OGE work force. This is critical. Hence, we endeavor to engage in industry-academic collaborative research to develop a fatigue measure attuned to the OGE workers, offering high reliability and validity to assess fatigue in the OGE workers. This industry collaboration will likely enhance adoption of the fatigue measure. Moreover, our collaborative exercise of developing industry relevant measure would perhaps develop further insights on causes and consequences of fatigue, thus influencing the development of fatigue management practices.

9. Shortz, Mehta, TAMU
The effect of cognitive fatigue on worker perception, task performance, and neural cost
Fatigue has been identified as a leading factor contributing to accidents in a wide variety of environments including the oil and gas, medical field, manufacturing, and transportation. The effects of fatigue have been shown influence workers ability to perform safe actions and alter job performance. The aim of this study was to investigate the relationship between cognitive performance, neural cost associated, and operator perception of cognitive fatigue. Twelve participants completed 1-hour cognitive fatigue trial where they performed two tests of 30 minutes each: 1) Stroop Color Word and 2) 1-Back Test. Both tasks were chosen to target basic working memory functions and have shown to induce cognitive fatigue when performed at longer durations. Cognitive fatigue was defined as an increase in self-reported Profile of Moods States fatigue subscale score. Task performance outcomes included percent correct responses and reaction time for each task. Neural cost associated with the prefrontal cortex was quantified using functional near infrared spectroscopy, a neuroimaging technique. Self-reported mental demand scores were reported on a 0-10 scale every 10 minutes during 1-hour trial. As fatigue is becoming an increasing health and safety concern, it is critical to understand the implication of cognitive fatigue on task performance.

10. Bridges, Benden TAMU
Evaluation of an ergonomic desktop software
The objective of this project is to evaluate and analyze an ergonomic desktop software dataset that uses a software-assisted break reminder system (SABRS), ergonomic desk configuration evaluation, and objectively reported body part discomfort questionnaire to evaluate if data can determine and ultimately reduce, body part discomfort (Musculoskeletal disorders or repetitive strain injuries (RSIs)), increase break compliance, and increase productivity. In 2014 musculoskeletal disorders (MSDs) accounted for 32 percent of all injury and illness cases for all industries. It is estimated that employers spend as much as $20 billion a year on direct costs for MSD-related workers' compensation and up to five times that much for indirect costs. A study by the National Institute for Occupational Safety and Health (NIOSH) has shown that regular breaks reduce repetitive strain injuries (RSIs) and also increase productivity. A 13,762 participant dataset with 79 variables gathered over 28, 91, 364 day time-frame will be statistical evaluated and compared to objectively reported postures, desk configuration, and body part discomfort questionnaire to

determine if there are positive or negative changes overtime. Uses of this software would be to provide companies who have workers that use computers on a daily basis to effectively detect and manage musculoskeletal disorders to reduce workers compensation costs. The software uses individual's specific components (variables) that produce a method that will ultimately change worker's behaviors by effectively and efficiently managing work breaks. Results are on-going and preliminary results will be shared.

11. Ritchey, Johnson, Batarse, Peres, TAMU
How Symbol Design Affects Compliance To Warnings In Industrial Written Procedures
Written procedures are an integral part of industrial work. The safety and well-being of workers, and product quality, depends on how well written procedures are designed and implemented. Of particular importance is the design of warning symbols. Research on product warning labels has shown that effective warning symbols include three pieces of information: 1) what is the hazard, 2) what are the consequences of exposure to that hazard, and 3) what are the preventative measures needed to avoid the hazard (Wogalter, 1999). This study is investigating how procedural compliance to warning information in industrial written procedures is affected by the inclusion of all or some of these three components in warning and caution symbols. Participants will complete tasks using procedures in which warnings contain symbols that represent either 1) the type of hazard only, 2) the hazard type and consequence, or 3) the hazard type, consequence, and prevention. An industrial warehouse that houses 12 different procedualized tasks was created in the virtual online world Second Life. Participants will complete these tasks in the Second Life virtual environment and their compliance to warnings will be used to evaluate the effectiveness of the three types of symbols. Preliminary data will be reported as this study is currently in progress.

12. Sharma, Benden, TAMU
The use of a computer software as a behavioral intervention to increase and sustain sit-stand desk usage
Objective: To determine if the behavioral intervention of using computer software interaction is an effective method in increasing and sustaining the use of sit-stand desks. Background: Sit-stand desks have been shown to increase physical activity in the workplace, but the studies conducted have shown a reduction in the utilization of the desks over a period of time. Therefore, increased use and sustainability remains a challenge with sit-stand desks. Researchers have seen modest reductions in sedentary time with sit and stand desks over short term follow up interventions, but have yet explored long term interventions aimed at increasing sit-stand desk usage. Studies have used computer prompts to increase physical activity in occupational settings but have shown to decrease the productivity of workers as they have to leave their workstations. A challenge remains to increases and sustain the use sit-stand desks while maintaining or increasing the productivity. Experimental Design: The proposed study will take place in an Australian governmental office complex of approximately 680 participants with current electric sit-stand workstations. The company will be monitoring their workers with a software used for office ergonomics and asking their employees about their sit-stand desk usage, physical activity, height and weight. All data will be collected and de-identified by the company and provided to Texas A&M University researchers as 'secondary data' for analysis. The goal of this proposed study is to determine whether a specific behavioral intervention (independent variable: IV) of computer interface is effective at increasing and sustaining sit-stand desk usage (dependent variable: DV). Expected Results: With this study, we hope to evaluate a behavior intervention (use of computer interface) in the workplace that could reduce sedentary behavior and improve health. The goal of this study would be for employers to use the results from this study to decrease sedentary time and improve employee's health in their work organization.

13. Widlus, Jones, Texas Tech
Steps toward an Intention Prediction System for Assistive Robots
In an ideal situation, assistive robots would be able to determine which actions we intend to perform before we begin to execute those actions. This would allow assistive robots the opportunity to interject when they're needed, before we put ourselves in potentially dangerous situations. For example, if an elder intends to attempt a reach to obtain an object from a high shelf, the assistive robot would be able to recognize this and provide aid before the elder attempts a potentially dangerous stretch. In order to provide assistance before the onset of action, the robot must be able to predict the user's intention. From the ecological psychology literature, there is reason to believe that there is something in one's exploratory patterns that belays one's intent, and that this is a unique, specifying relationship which is powerful and definitive (Riley, et al., 2002; Turvey, 1988, 1990; Turvey, et al., 1990). If this is true, we would be able to leverage that for this robot intention recognition system. While this unique relationship between exploration and intention has been theoretically proposed, there is very little literature that makes the step forward into the realm of intention prediction. Our first step is to begin hunting for the unique exploratory patterns that specify a given intention. We decided begin this process by looking at the exploratory arm movements related to reach. Past research has found in a number of cases that restricting exploration results in less accurate affordance judgments (Mark, et al., 1990; Yu, Bardy & Stoffregen, 2011). Thus, we developed an arm-restriction paradigm in which participants made judgments of maximum reach with or without restricted arm movements. Participants made judgments by walking toward or away from an object until they reached their judged point of maximum reach. Our expectation is that the restriction of exploratory arm movements will result in a decrease in accuracy of reaching judgments. If correct, these results would imply that exploratory arm movements are involved in judgments of reach. Future research would apply arm restrictions to other judgments, such as maximum kicking distance, to confirm the theory that one's exploratory patterns are uniquely related to one's intent. Data collection for this study is currently ongoing. We expect that we'll have at least preliminary results to present by the date of the conference. Riley, M. A., Wagman, J. B., Santana, M., Carello, C., Turvey, M. T. (2002). Perceptual behavior: recurrence analysis of a haptic exploratory procedure. Perception, 31, 481-510. Turvey, M. T. (1988). Simplicity from complexity: archetypal action regimes and smart perceptual instruments as execution-driven phenomena. In Dynamic Patterns in Complex Systems. 327-347. Turvey, M. T. (1990). Coordination. American Psychologist, 8, 938-953. Turvey, M. T., Carello, C., Kim, N. G. (1990). Links between active perception and the control of action. In Synergetics of Cognition. 269 - 295. Mark, L.S., Balliett, J. A., Craver, K. D., Douglas, S. D., Fox, T. (1990). What an actor must do in order to perceive the affordance for sitting. Ecological Psychology, 2(4), 325-366. Yu, Y., Bardy, B. G., Stoffregen, T. A. (2011). Influences of head and torso movement before and during affordance perception. Journal of Motor Behavior, 43(1), 45-54.

14. Braly, DeLucia, Texas Tech
Can Training Improve Collision Judgments?
The optical expansion pattern can provide observers with accurate information about when approaching objects will reach them (Lee, 1974). Observers are sensitive to this information when making judgments about such time-to-collision (TTC; Todd, 1981). However, observers do not always use this accurate information when other information is available. Multiple information sources and even cognitive and affective variables can influence TTC judgments (DeLucia, 2013). It not known whether observers can be trained to use the most accurate information. Prior studies using computer simulations indicated that training can improve collision detection (DeLoss et al., 2015), and braking tasks (Fajen, 2005), but effects of training on TTC judgments were not investigated. We examined whether training with stroboscopic (intermittent) viewing improves TTC judgments, as it improves motion coherence thresholds and coincident anticipation tasks for lateral motion (Appelbaum et al., 2011; Smith & Mitroff, 2012). Observers viewed computer simulations of an object that first approached them and then disappeared, and pressed a button when they thought the object would hit them. Effects of training on TTC judgments were compared between stroboscopic and continuous view training conditions (and a control filler task). Results will be discussed.

15. Armstrong, Jones, Texas Tech, Schmidlin, Sony Computer Entertainment America,
Robots to the Rescue: Tele-Operator Training for Urban Search and Rescue
Incorporating robots into Urban Search and Rescue (USAR) can reduce risk for human aid workers. Unfortunately, these robots often get stuck in collapsed structures (Casper & Murphy, 2003) which instead increases risk for human aid workers. USAR tele-operators report difficulty judging whether their robot is capable of driving through openings or over obstacles (Casper, 2002). If tele-operators could accurately judge whether they were capable of safely driving the robot through apertures, then USAR robots would get stuck less often. A previous study (Jones, Johnson, & Schmidlin, 2011) demonstrated that training programs in which tele-operators both explore their environment previous to making judgments and receive feedback about their judgment accuracy result in more accurate perceptual judgments over time. Our research investigated 3 types of training programs to determine what factors are necessary in training in order for tele-operators to learn to make more accurate judgments. We hypothesized that exploration alone is sufficient to increase these types of perceptual judgments. Therefore, training programs that incorporate exploration were predicted to result in higher accuracy when making perceptual judgments than training programs without exploration. Two experiments tested this hypothesis. In each experiment, participants were divided evenly into one of three training types: No Exploration and No Feedback, Exploration and No Feedback, and Exploration and Feedback. For each training type, participants were asked to judge whether they could tele-operate a robot through an aperture for multiple trials, with aperture width varying between trials. For each trial in the No Exploration and No Feedback training type, participants made their judgment without driving the robot. For the Exploration and No Feedback training type, participants drove the robot towards the aperture, made their judgment, and stopped driving. For the Exploration and Feedback training type, participants drove the robot towards the aperture, made their judgment, and attempted to drive the robot through the aperture. Thirty novice tele-operators participated in Experiment 1. All participants completed 4 blocks of training trials and then 1 block of assessment trials in which we measured their judgment accuracy. As predicted, the two training types that incorporated exploration (the Exploration and No Feedback and the Exploration and No Feedback training types) resulted in higher judgment accuracies than the No Exploration and No Feedback training type. One limitation of this experiment was that we did not measure learning and therefore could not know for sure that the higher accuracies were due to learning and not due to group effects. Experiment 2 was designed to address this concern and to replicate the findings of Experiment 1. The procedure included an additional assessment block at the beginning of the study so that judgment accuracies at the first and last blocks could be compared in order to verify that learning occurs. Data collection is not yet complete but will be by the time of the Houston Symposium. We will discuss the results of Experiment 2, compare them to those of Experiment 1, and conclude with the practical implications of the two studies.

16. Levulis, Schumacher, Texas Tech
The Relationship between State-wide Handheld Cell Phone Bans and Fatal Motor Vehicle Accident Rates: An Epidemiological Study Using Hierarchical Linear Modelling
Ninety percent of American adults own a cell phone (Pew Research Center, 2014), and at any given daylight moment, approximately 739,200 of them are using one while driving (NHTSA, 2014). A substantial amount of experimental research has examined the effects of cell phone conversations on driving, and it is now well established that cell phone use can have detrimental effects on certain components of driver performance (Caird, Willness, Steel, & Scialfa, 2008; Horrey & Wickens, 2006). Strayer and Johnston (2001) proposed two competing explanations for the interference produced by using a cell phone while driving: The peripheral-interference hypothesis attributes any interference to peripheral factors such as the act of holding the phone. The attentional hypothesis posits that the interference is due to a diversion of attention away from driving towards the phone conversation. While the majority of research supports the attentional hypothesis (Hendrick & Switzer, 2007; Patten, Kircher, 'stlund, & Nilsson, 2004; Strayer & Johnston, 2001; for a review, see Horrey & Wickens, 2006), legislation has implicitly supported the peripheral-interference hypothesis by solely banning driver use of handheld cell phones. In 2001, New York became the first state to institute a state-wide ban that prohibits all drivers from using handheld cell phones. Since then, thirteen other states and the District of Columbia have instituted state-wide cell phone bans for all drivers (Governors Highway Safety Association, 2016). However, the efficacy of such bans is unclear. A review of studies examining the effects of state-wide, handheld cell phone bans on crash measures found that results varied widely across studies, and determined that the effectiveness of such bans is still not fully understood (McCartt, Kidd, & Teoh, 2014). The purpose of this study was to add to our understanding of the effectiveness of current legislation banning driver handheld cell phone use by comparing the rates of fatal motor vehicle accidents in states with and without a state-wide handheld cell phone ban in place during 2012 (the most recent data available). We omitted states that introduced a state-wide ban during 2012, which produced a final dataset consisting of fatality rates for 3,143 counties from 48 U.S. states and the District of Columbia. We employed hierarchical linear modelling, a relatively new approach that can handle nested data collected at multiple levels, which often violates assumptions of independence inherent in other traditional general linear model analyses. Our dependent variable was a county-level measure of the number of fatal motor vehicle accidents per 100,000 people. We compared states with and without 2012 handheld cell phone bans while controlling for county-level (population) and state-level (population, rural vehicle miles travelled, urban vehicle miles travelled) variables. The results of the study will be discussed, along with the limitations of this and other epidemiological research.

17. DeLeon, Kelling, UHCL

Comparing Differences in Near Transfer of Virtual Training on Consumer Quadcopter Drone Flight

While several aspects of drone flight training have been examined especially regarding drones, a gap exists regarding smaller consumer drones. As the consumer drone sector is expected to expand significantly over the next few years and regulations are currently being developed, a greater understanding about the human interaction with these systems is necessary. This study seeks to investigate the effects of different training foci and gaming experience on consumer drone flight. The foci of interest for this poster include near transfer of drone specific and flight general. Game based navigation, and control (no training) groups will also be looked at in the near future. Results of this work will aid our understanding of how to adapt training schemes as well as estimate general capabilities of individuals who may utilize these types of consumer drones.

18. Avera, DeLeon, Sutherland, UHCL, Sun, Harteveld, Northeastern University

The Best Predictor of Future Reliance is Past Reliance

In our everyday lives, we face numerous decisions of varying levels of complexity and with varying levels of uncertainty. When tasks become too complex or we become unable to reduce uncertainty on our own, we often find it necessary to rely on decision support systems, such as statistical models, automation, or recommender systems to assist us in making better decisions. However, implementation of automated decision aids is challenging because it is difficult to predict when and why people will rely upon them. Factors associated with the automated decision aid, the user, the task, and environment in which the task is completed have all been shown to impact the use of the aid (Hoff & Bashir, 2014; Sutherland, Harteveld, & Young, 2015). To further identify factors that affect reliance on automated decision aids for complex tasks (e.g., a lot of data to consider) and in dynamic environments, participants were asked to make numerous decisions in a game created to simulate the logistics system used by operators at the Port of Houston. Participants completed a tutorial to acclimate themselves to the game followed by three challenges, each involving 20 decision-making phases, including choices about both ship prioritization and oil spill recovery strategies. An automated decision aid gave three recommendations for ship prioritization for each decision phase during the last two challenges, with the final challenge additionally providing justification for the recommendations. We studied the decisions regarding the scheduling of ships made before, during, and after a simulated oil spill to determine whether participants continue to rely on the automated decision aid even when a natural disaster, which the automation would likely not consider, impacted the supply chain and whether the player's performance with and without the use of the automation impacted reliance during these phases. Our preliminary analyses show that performance for each challenge, demonstrated by either winning or losing, did not significantly impact participant reliance on the decision aid. In fact, the only clear predictor of reliance on the decision aid was reliance during previous challenges, regardless of past success or failure, illustrating that there may be an underlying distinction between adopters and non-adopters of automated aids that endures regardless of performance. Additionally, compliance with the decision aid's recommendations remained stable before, during, and after the oil spill, suggesting that reliance continues when the data the system uses is no longer reliable. Hoff, K. A., & Bashir, M. (2014). Trust in automation: Integrating empirical evidence on factors that influence trust. Human Factors: The Journal of the Human Factors and Ergonomics Society. http://doi.org/10.1177/0018720814547570 Sutherland, S. C., Harteveld, C., & Young, M. E. (2015). The role of environmental predictability and costs in relying on automation. In Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (pp. 2535'2544). ACM.

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20. Collier ERAU

Physiological effects of using PX3 Bite Regulators while sleeping, training and in competition in the prevention of concussions and traumatic brain injury among NCAA Division I Athletes.

This study will investigate whether enhanced respiratory, skeletal, physiological and neurological benefits offered by PX3's new bite regulator technology represent key variables in reducing concussions among NCAA Division I athletes. We expect to see an increase in physiological performance and a subsequent greater decrease in concussions in subjects using the PX3 Bite Regulator compared to same-sport athletes using traditional mouthguards or no mouthwear over the same time period.

21. Boykin HFES Alamo Chapter

An Overview of Army Research Laboratory ' Army Medical Department Field Element Research

Over the past four years, researchers at the Army Research Laboratory ' Army Medical Department Field Element located at Fort Sam Houston, Texas have made great strides to incorporate and apply human factors principles to improve Soldier performance. The purpose of this presentation is to provide an overview of research process information, along with preliminary results, from current studies. Three research studies with ~850 Soldier and Veteran volunteers will be covered: Mindfulness Based Stress Reduction (MBSR), Personal Academic Strategies for Success, and Neurocognitive Temporal Training. Future research objectives will also be identified.

22. Russi-Vigoya, Harper, HP

Evaluating HP Sprout as an Aid in Participatory Design Research

Given the limited amount of time and resources in many industries, early prototype research is often put aside, however doing research at the low fidelity prototyping stage is a good way to receive user feedback before the product is too far along the development process to make significant changes. Finding ways to gain information from the user at the prototype stage can be critical to ensure the product is on the right path and can help companies avoid costly development mistakes. Participatory design is one method of testing a design idea that is early in development. It can be used to generate ideas for a product or to add definition to early prototypes. It is important to remember that participatory design results in artifacts, physical or virtual forms that are somewhat representative of a product and are not meant to show a final product. The method produces low-fidelity artifacts which are messy and incomplete. It is not the artifact created which is the most valuable output but the thoughts and decisions made by the participants during the creation process that is the most valuable; this is where you gain insight into end users priorities. This study investigates the use of the HP Sprout during the low fidelity prototype stage using participatory design techniques. The HP Sprout is an all in one computer with 3D scanning capabilities and multi-touch object manipulation between 2 screens. The results of this study will help practitioners learn about the opportunities and limitations of using the HP Sprout for user research.

23. Mahesh, V., Li, G., Li, Y., Craig, B., Lamar Univ.

Effect of Flooring on Lower Extremity Discomfort and Fatigue during Food Service Tray-line Jobs

Effect of Flooring on Lower Extremity Discomfort and Fatigue during Food Service Tray-line Jobs Introduction Tray-line jobs are often the most stressful of all food service jobs and require hours of standing at a stretch in extremely hot, wet, humid and noisy conditions with enormous demands on work. The task translates to prolonged hours of static work in awkward postures and frequent stretching motions that can result in strained muscular positions of lower leg and repeated loading of a few muscular regions of lower leg and back during the shift. Over time, this can significantly increase the risk of Cumulative Trauma Disorders (CTDs). Though the physical demands during tray-line jobs was found to be associated with a high risk of CTDs, a comprehensive assessment of tray-line jobs with ergonomic flooring intervention has not been made. This research seeks to investigate the extent to which flooring mats affect discomfort and fatigue level among food service workers on tray-line duties. Methodology A food service tray-line job was simulated in the lab. As a preliminary research, six participants participated in the study and performed the simulated tray-line job. The study involved two flooring conditions, namely a hard floor and an ergonomic flooring mat. Dependent variables include lower leg volume change, muscle temperature change, blood pressure change and pulse rate change. Questionnaires were also employed to obtain the participants' subjective perception of fatigue and discomfort levels. An instruction was developed for the participants and training was provided before the experiment. The experiment last about 1 hour. Results and Conclusion Results showed a significant effect of flooring condition on the muscle temperature change in Tibialis Anterior and Quadriceps. In both muscles, skin temperature decreased for the hard floor condition, while increased for the flooring mat condition. The analysis of lower leg volume change showed an increasing trend for leg volume with hard floor and a decreasing trend with flooring mat. But the effect was not significant. The results of the surveys showed higher fatigue and leg discomfort level for the hard floor compared to the flooring mat. The drop in muscle temperatures and increase in lower leg volume on hard floor could be a result of a better blood circulation. Although better blood circulation is associated with relieving fatigue on constrained standing, hard floor led to a perception of higher fatigue level. This points to an alternate cause for fatigue, which could be related to local muscle fatigue and can be measured by EMG signals. It was concluded that the hard floor enabled better circulatory benefits for the lower limb. However the flooring mat was assessed to be better at relieving localized muscle fatigue of lower leg. For a typical tray-line activity, the factor that contributes more to the perception of discomfort and fatigue of lower limbs could be local muscle fatigue rather than circulatory effects. The following research will use EMG signals to measure the muscle fatigue level.

24. Illori, A., Li, G., Li, Y., Zhang, J., Craig, B., Lamar Univ.

Effects of Category Wording and Color Contrasts on the Usability of a Library Website in a Language-Diverse Institution

Introduction Higher institutions in the United States are becoming increasingly diverse in terms of nationality and essentially, language. With this diversity comes the need to provide tools and technology to support these non-native English speaking population. One of such supportive technology is a library website - an interface that provides students and member of faculty with an online access to various research and study materials within the university and beyond. The study aimed to evaluate the effect of category wording and color contrast so as to improve the efficiency and user satisfaction of a library website for a language-diverse population. Methodology At first, a focus group was created with a fair representation of all stakeholders (undergraduates, graduates and faculty members) to find out the demographic information of the users. Subsequently, a questionnaire was developed that provided detailed questions to gathered users' opinions of the current library website. Based on the results, two design features were chosen as the independent variables: category wording and color contrast. The research team developed another two levels of color contrast and one more level of category wording. With these new versions, experiments were conducted to determine the differences in terms of usability between the existing system and the new ones. Dependent variables include completion time, number of clicks and success rate. Subjective questionnaires were also used to collect information on the user-friendliness of each interface. Twelve participants were employed in the study. The experiment lasted around 1 hour. Results and Conclusion Results showed significant improvements where simpler and direct wordings were employed for search categories ($p < 0.01$). These improvements were measured in terms of how fast a student is able to complete a search task and how successful a search task is with the least number of clicks. Changes in color contrasts didn't seem to have much significance in terms of performance rather it just proved to be an issue of personal customization preference ' this was evident in responses to the subjective questionnaires. Due to the rapidly increasing enrollment rate of International students in Universities in the US and other predominantly English speaking countries, it is believed that the study will go a long way in enabling universities provide more user friendly interfaces for their libraries and other educational/ IT resources to accommodate the population of students and faculty who are non-native English speakers.

25. Dabiran, Y., Navuluri, S., Piya, S., Li, Y., Craig, B., Lamar Univ.

Music Ergonomics: A Study on Violin/Viola Shoulder Rest

Introduction In recent years greater attention has been paid to medical problems of musicians than ever before, however musician's ergonomics remains an area with less visibility. Playing string instruments is hard-work and requires repetitive accurate movements. To achieve needed skills in order to play professionally, frequent long hours of practice is imperative. Due to their body postures during long rehearsal or performance hours, musicians have a high risk of musculoskeletal disorders and chronic ailments which could even end their careers. Overuse syndrome, focal dystonia and nerve compression are some of the most common diseases in violinists and violists. Similar personal experiences of discomfort while playing string instruments made us think of possible ergonomic changes that can be done to produce more comfort. This study aimed to identify the ergonomic issues in violin/viola players and look for ergonomic improvements to reduce the occupational injury. Methodology In the Phase 1 of the research, a discomfort survey containing various questions on the level of stress, repeated injuries and playing postures was conducted among the members of Symphony of Southeast Texas. Nine Violinists and one Violist have participated in this survey. The results of this survey shed light on the major difficulties that musicians face using a regular stiff curved shoulder rest. This led to the Phase 2 of the research, in which an extensive search for a shoulder rest with different design was conducted. As a result, a unique and ergonomic shoulder rest was suggested. Then in Phase 3, a preliminary research, a violinist was asked to use the suggested shoulder rest for two weeks and a second discomfort survey was conducted. Results and Conclusion The results indicated that the design of shoulder rest can play an important role in the comfort level of violin/viola players. The results of the Phase 3 were encouraging; the degree of pain/discomfort decreased while using the new shoulder rest. Based on the volunteer violinist's experience the suggested shoulder rest is more comfortable and more adjustable than the regular stiff curved ones. In following research, more violinists/violists will be asked to participate in the study and physiological measurement will be recruited.

26. Levy, Dundar, Tremmel, Old Dominion University

B.E.L.A.: Brain-computer-interface for Entertainment and Language Assistant

This poster explores the challenges that patients with limited motor and speech functions can experience, and proposes a novel design solution to improve communication between those patients and medical professionals. A Brain-Computer Interface was used as a method for the interaction between user and interface and designed B.E.L.A. Through research, interviews, prototyping, and usability testing. B.E.L.A showed great potential to make healthcare more efficient while rapidly increasing the quality of life among its users.

27. Rodriguez Paras, Mehta, TAMU

fNIRS Applications in Human Factors and Ergonomics

Functional near-infrared spectroscopy (fNIRS), which measures hemodynamic responses associated with neural activity, has gained popularity in recent years as a neuroimaging tool. The acceptance of fNIRS is mainly due to the advantages it offers over several other neuroimaging techniques, such as being low-cost, non-invasive, portable, and safe to use on diverse populations. These advantages have permitted fNIRS to be implemented in several studies over a wide range of human factors working sectors, such as healthcare, aviation, transportation, physical ergonomics, safety, and law enforcement. The present study discusses application of fNIRS in human factors and ergonomics domains across different industry sectors. The many advantages and disadvantages of fNIRS are discussed in a comparison with other neuroimaging techniques, particularly as they relate to determining operator workload, vigilance, and well as ergonomic risks, and development and design of training systems. Measurement systems criteria (reliability, validity, sensitivity, feasibility, etc.) pertaining to fNIRS across these HF/E applications will be examined.

28. You, Pickens, TAMU
How to Prevent Low Back Injuries from Manual Lifting Tasks: A Study of Kinect Motion Capture System with Markers.
In general, manual lifting workers in manufactories often have low back injuries even though they are trained before involving in working places. We design a motion capture system by using Kinect system from Xbox and explore whether the device helps to promote the effectiveness of training for lifting heavy objects in manufactories. This research aims to validate and check the performance, accuracy and reliability of the prototype of the Kinect motion captures system with markers. Since our novel Kinect motion capture system with markers is created to increase accuracy, we conduct the validation check for the novel Kinect motion capture system to see whether our system can well track the markers on the participants' body posture when they perform manual lifting tasks. There are two experiments: 1) the first experiment aims to explore whether the results significantly differ across different backgrounds/circumstances and 2) the second experiment is for examining whether the results significantly vary across different types of movement. In the first experiment, there are three different types of background: 1) normal background, 2) wall background, and 3) screen background. This experiment has an assumption that the performance of the Kinect motion capture system will be differ depending on background conditions. Since the system is for collecting motion capture through the measurement of the distance between the Kinect and a participant, it is important to examine how different background conditions affect the result. The second experiment is about whether the collected data differ depending on motion types. We categorize participants' lifting motion in the three ways: 1) lifting an object from the ground, 2) lifting an object over the head and 3) lifting an object with a step. Those scenarios with different motion types allow us to explore whether different motions influence the results collected by the Kinect device with tracking markers. We found that developing Kinect motion capture with markers has a precise data collection in terms of correct rate, miss rate, and false rate from 10 participants. Those rates allow us to investigate how the Kinect device read human body's motion precisely. In the background experiment, we found that false rate is significantly high in the normal background. It indicates that Kinect is sensitive to the other materials such as chairs, desks, and windows when it tracks markers on the participants' body. Our findings indicate that uneven background increases error rates. In the motion experiment, we found that the miss rate is significant high in the lifting task with a step. It indicates that developing Kinect system is sensitive to the more movement. Trainers and ergonomists can have advantages in suggesting the reference and better posture to manual lifting workers with developing Kinect system that helps to increase their cognitive ability to recognize the accurate posture to prevent low back injury.

29. Tippey, Mack, TAMU
Weather Alerts within General Aviation
Fatal trends involving General Aviation pilots have shown an increase in weather-related crashed due to the nature of unexpected changes in conditions and the quick decisions that are encountered. Because weather conditions change unexpectedly, poor-decisions are often made which leads to disturbing consequences. In an effort to look at the way information is distributed and human factors issues associated with cockpit interaction, this presentation highlights a study of minimum display characteristics of cockpit weather alerts to support accurate and timely responses from general aviation pilots, while not taking away their situational alertness from flight. This study involved General Aviation pilots participating in two scenarios in a Flight Training Device with the assistance of two weather alert devices, a tablet and a smartwatch. The devices used communications from a simulated air traffic controller, regularly scheduled reports including Meteorological Terminal Air Reports and Terminal Aerodrome Forecasts. Also included were off-schedule alerts, such as Notice to Airmen, Pilot Reports and Airman's Meteorological Information reports. The effectiveness of the alerts were tested in five different conditions: (1) Baseline, with encoded text only, (2) Baseline along with textual summary, but no audio, (3) Baseline with auditory chime to alert of the text arrival, (4) Baseline with text summary and auditory chime, (5) Baseline with text summary and synthetic verbal annunciation of the summary. Reaction time and acknowledgement time of the off-schedule alerts, as well as the preciseness of the weather-related decision and the measures of situational awareness were recorded through the Situation-Present Assessment Method. The results pointed towards potential gaps in the communication of pre-flight information and lack of knowledge of the technology related to weather alerts including the importance of auditory/multisensory cues. Condition five, the textual summary (a visual cue) along with verbal annunciation of the summary (an attention-grabbing cue that alerts the pilot though management relation decisions) resulted in the best performance. The results also suggest an auditory cue without the text summary can lead to situational awareness. These findings can be used alongside the FAA guidelines when designing weather alert technology.

30. Hoyle, Peres, TAMU
The Usability of a Procedure Writing Tool for High Risk Work Environments
Procedure use and adherence plays an integral part of safe work practices in high-risk environments such as oil and gas, nuclear, pharmaceutical, and medical industries. According to several accident root-cause analyses, improperly used and inaccurate procedures` contributed to a high number of incidents in high-risk industries and has often resulted in serious safety implications. Since human performance issues have been associated with these incidents; it is imperative to understand the complexities involved in the procedure development process. Developing effective procedures presents a myriad of challenges such as identifying applicable, technical, and regulatory requirements along with the associated hazards of each job task. Significant progress has been made in the practices and supporting technologies surrounding procedure development for the purpose of improving efficiency, reliability, and safety in operations. The most notable changes have taken place in the various processes for generation, maintenance, design, use, and format of procedures. Procedure writers have become key contributors in communicating to operators the step-by-step instructions, potential hazards, and the equipment used to complete tasks safely. Moreover, if the usability of the procedure development tool utilized by the writers' is problematic then it is conceivable that the procedures the operators use may not receive all of the information needed to complete their tasks safely and efficiently (e.g. information in the correct order or associated with the correct step). The goal of this study was to examine how the usability of a procedure development tool impacts the writer's ability to produce effective procedures. A mixed-methods approach was used in this study. Contextual interviews were conducted in Phase I in order to develop user profiles and user goals. In Phase II, scenario-based usability tests were administered in order to evaluate the user interface of the procedure development tool. Understanding the complexities of the procedure development practices and technology are vital in the pursuit of producing useful procedures that are beneficial in the reduction of human performance related problems.

31. Sasangohar TAMU

Interruption Recovery in Supervisory-level Command and Control

The negative effects of interruptions on task performance in modern work environments are well documented. However, in most time-critical supervisory-level tasks such as emergency response and mission command and control, interruptions to supervisors may contain valuable information necessary for the execution of the task. In such cases, supervisors may need assistance to manage or recover from interruptions as efficiently and effectively as possible. An interruption-recovery tool was designed to recover mission commanders from interruptions in a simulated Unmanned Aerial Vehicle operation. A user study was performed to evaluate the efficiency of the tool to recover mission commanders from interruptions as efficiently and effectively as possible. The tool showed promise in reducing the time to resume and improving decision accuracy significantly.

32. Lodinger, DeLucia, Texas Tech

Interruptions in laparoscopic surgery: Does camera view influence resumption lag?

Frequent interruptions occur during surgeries in operating rooms (Blocker et al., 2012; Sevdalis, Arora, Undre & Vincent, 2009; Wiegmann, ElBardissi, Dearani, Daly & Sundt, 2007). Surgeons are interrupted more often than other operating room staff (Gillespie, Chaboyer & Fairweather, 2012). More interruptions occur during laparoscopic surgery than during open surgery (Healey, Sevdalis & Vincent, 2006). According to Altmann & Trafton's (2002) Memory for Goals Model, interruptions interfere with the activation of a goal. That is, the interrupting task becomes the active goal in memory, while the primary task goal decays. To resume the primary task, the primary task goal has to become the active goal again to be retrieved from memory. Consequently, a resumption lag is observed when the primary task is resumed after being interrupted (Altmann & Trafton, 2004). Characteristics of an interrupting task, such as cognitive demand and duration, can influence the decay of the primary task goal and therefore influence the resumption lag (Hodgetts & Jones, 2006; Monk, Trafton and Boehm-Davis, 2008). We hypothesize that resumption lag is influenced by the camera view in laparoscopic surgery. Perceptual and cognitive costs and benefits differ among front, top, and side camera views (DeLucia & Griswold, 2011). We sought to determine whether resumption lag depends on the camera view with which the primary task is performed. Participants performed a peg-transfer task with a surgical grasper while viewing the pegs with a top or side camera view. Resumption lag was measured after the primary task was interrupted. Interruption duration and cognitive demand were varied. We predicted a shorter resumption lag for the top camera view because it has a lower number of cognitive costs than the side view. According to the Memory for Goals model and the DeLucia & Griswold (2011) study, the shortest resumption lag should occur when using the top camera view following a short interruption of low cognitive demand. The longest resumption lag should occur when using the side camera view following a long interruption of high cognitive demand. Results will be discussed.

33. Neilson, Klein, Reine, Bukowski, Priestly, Texas Tech

Aquatic Nature Images and Green Nature Image Result in Different Perceived Restorativeness Ratings

The idea of restorative environments stems from the well-researched restorative effect, which refers to restoring depleted cognitive and emotional resources after exposure to nature but not urban environments; this results in improved cognitive performance and physical recovery for those exposed to nature (Kaplan & Kaplan, 1989; Kaplan, 1995; Berto, 2005; Ulrich, 1984; Ulrich et al., 1991; Kaplan & Berman, 2010, Gidlow et al., 2015, Berman, Jonides, & Kaplan, 2008, Hartig, Mang, & Evans, 1991). Previous research has shown that incorporating more restorative environments into the workplace helps to develop healthy and productive work environments (Heerwagen, 2008). The most prominent theory of the restorative effect is Kaplan's (1995) Attention Restoration Theory, which states that nature grabs involuntary attention via fascination and frees up resources for directed attention, allowing directed attention to recuperate. Importantly, the restorative effect is not limited to actual immersion in natural environments but can also be induced by viewing digital nature images (Kaplan, Kaplan, & Wendt, 1972; Berto, 2005). Prior research by White and colleagues (2010) assessed the impact of the proportion of water in natural environments on participants' overall ratings (i.e., composite score) of the short-version of the Perceived Restorativeness Scale (short PRS; Berto, 2005). The present study assessed the perceived restorativeness for nature images that contained only aquatic features (no greenery) and compared them to images that contained only greenery (not water) and only urban environments (no water or greenery) instead of using images that had various proportions of water and greenery, as conducted in previous research (White et al., 2010). Ten participants were recruited from Introduction to Psychology courses at Texas Tech University. These participants were shown twelve pictures (4 aquatic-only, 4 green-only, and 4 urban-only) in random order and asked the short-version of the Perceived Restorativeness Scale. Pairwise comparisons were conducted using a Boneferroni adjusted alpha level of .017 (.05/3) per test on the composite scores, which are the average ratings across the four dimensions. We found no significant differences in ratings on the short-version of Perceived Restorativeness Scale's (PRS) for aquatic-only (M = 8.08, SD = 1.63) compared to green-only images (M = 7.61, SD = 1.97), p = .574, but both had superior ratings on the short PRS compared to urban images (M = 4.38, SD = 1.03), p < .001 for aquatic vs. urban and p = .003 for green vs. urban. These differing results from White et al.'s (2010) may be due to aquatic images giving a 'lost at sea' feeling that reduces it's restorative potential compared to aquatic-mixed images. Our next study, which is currently being conducted, is assessing the impact of color on the restorative effect and specifically the effect of water by comparing the same images but manipulating color: 1) original image color, and 2) greyscale image. Results from this study will be presented at the conference. When applying these findings to improving work environments, images of aquatic-only scenery will likely not have a significant benefit than images of green-only scenery.

34. Harris Texas Tech

Tau Attunement Training for Accurate Flare Initiation Timing

To land a fixed-wing aircraft, pilots must reduce their descent rate during the final stages of a landing approach (Grosz, Rysdyk, Bootsma, Mulder, Van der Vaart, Van Wiergen, 1995). This descent is arrested by performing a landing flare, also known as a roundout, which consists of 'a slow, smooth transition from normal approach attitude to a landing attitude, gradually rounding out the flightpath to one that is parallel with, and within very few inches above, the runway' (FAA-H-8083, pg 8-5). Landing flares are often considered one of the most technically demanding components of flying (Benbassat & Abramson, 2002). In fact, 18% of all landing accidents in United States airspace between 1995 and 2000 were attributed to problems with the landing flare (Benbassat & Abramson, 2002). It is essential that the landing flare is timed correctly, as flaring too early can result in a stall or overshooting the runway, and flaring too late can result in a hard landing (Grosz et al., 1995). Flares are typically initiated ten to twenty feet above the ground (FAA-H-8083). The FAA argues that while 'proper depth perception is a factor in a successful flare, the visual cues used most are those related to changes in runway or terrain perspective and to changes in the size of familiar objects near the landing area such as fences, bushes, trees, hangars, and even sod or runway texture' (FAA-H-8083, pg. 8-5). The visual cues alluded to in this description (i.e. linear perspective, texture density gradient, optical expansion, familiar size) are heuristics, and do not provide absolute information about the runway's distance or the time remaining before touchdown (DeLucia, 2013; Hochberg, 1978). The FAA's training focus on non-specifying heuristics may explain why student pilots typically struggle with flare initiation timing (AOPA, 2012). In contrast to heuristics, the optical invariant tau specifies the time remaining before a pilot reaches the runway (Gibb, Gray, & Scharff, 2010; Lee, 1976). Tau is defined as the instantaneous ratio between an object's visual angle and the rate of change of that angle (Lee, 1976), and research has shown that humans are sensitive to tau in a variety of tasks (Kaiser & Mowafy, 1993; Regan & Hamstra, 1993; Todd, 1981). Previous studies have shown that subjects can attune to optical invariants with practice and feedback (Fajen & Devaney, 2006) If student pilots can perceptually attune to tau to make flare timing judgments, the accuracy of, and required training for, flare initiation might be drastically reduced compared to traditional, depth cue-based methods. The proposed study will compare traditional, monocular depth cue-based training methods to tau attunement training. I predict that participants in the Tau trained condition will exhibit more accurate height estimates, with lower variability, when compared to traditionally trained participants. Methods and predicted results will be discussed. Feedback on the proposal and methods is much appreciated.

35. Flores U of H Space Architecture

Why Ramps Should be Avoided in Partial Gravity Environments Like Mars or the Moon.

Based on simple physics of motion mass stays the same while weight changes as a function of gravitational acceleration. The gravity on Earth is significantly higher (1 g) than the gravity on Mars (0.38 g) or the Moon (0.16 g). This leads to the friction force decreasing as the level of gravity drops while the momentum of a moving body stays constant. Therefore the acceleration levels required to stop or turn a human stay the same. These facts combined with the fact that the angle of a ramp reduces the normal component of weight in relation to angle. This will reduce the friction force available to maintain safe motion to potentially unsafe levels. As slipping and falling are an issue even on earth this poses a potential risk for crew performing task either inside or outside of vehicles. This study looked at some Earth analogs and also calculated and charted the required coefficient of friction to maintain a safe translation. Of course a ramp with and angle of zero is a floor such that the calculations were also correlated for normal motion to see what design specifications would be required.

36. Vazquez Klisans, Kelling, Barajas Barragan, DeLeon, UHCL

Investigation of Gamification within an Online Undergraduate Statistics Course

The application of game-design principles to enhance human performance within education settings has yielded positive results (for example, Barata, et al., 2013; Goehle, 2013; Howard-Jones et al., 2016). Game-based learning increases participants' motivation and engagement through the virtual interactions and rewards that games provide. Gamification thus leads to higher rates of execution and achievement of assignments, and it is hence spreading widely across schools and workplaces (Bohyun, 2015; Zamyatina, Yurutkina, Mozgaleva, & Gulyaeva, 2014). In this study, the effect that the inclusion of a competitive game environment into an online statistic course exerts on students' engagement is reviewed and discussed. Engagement with the material is measured through the analysis of students' access rates to the course content, academic performances and opinions about statistics. Participation in the study was limited to undergraduate students enrolled in an online statistic course. After the fifth assignment, they were administered an opinion survey about statistics for extra credit. Then, the students were randomly assigned to either a control or an experimental group. Participants in the experimental group can access a virtual game platform embedded into the class, whereas subjects in the control group cannot. Assignments, tests and lectures, however, remain identical for both groups. The aforementioned platform was designed to depict a virtual world with separate cities. Every city consists of three core areas: a market, a farm and a downtown. These areas are related to the course assignments, and are affected by the students' performance. For example, one assignment question could ask students to solve an exercise and then decide, based on their results, which fertilizer is most effective. If the students solve the exercise correctly and make the right selection, then a crop field is added to their farms. Thus, the game graphically represents individual performance through the addition or subtraction of buildings, crop fields, roads, and other urban resources. Each participant in the experimental group manages one city. Therefore, the platform has as many cities as there are participants in the experimental group plus one city managed by researchers for control. A competitive environment is created by the display of all participants' cities in the virtual world, allowing subjects to compare their performances. During the final week of the course, all research participants will be administered the same questionnaire as in the beginning. Additionally, for individuals in the experimental group, the survey will have two extra questions specifically about the benefits of the game. Final data analysis will be completed following the end of the Spring 2015 semester.

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