Xinyu Liu, PhD

Senior Staff Consultant

Dr. Xinyu Liu is a Senior Staff Consultant at Engineering Systems Inc. (ESi). He earned his Ph.D. degree in cognitive neuroscience from the University of Minnesota, Twin Cities. His area of expertise includes human visual perception and cognition, attention, visual working memory, and human information processing. Dr. Liu's research involves investigating the plasticity of the human visual system and understanding the neural mechanisms of human visual perception under a dynamic perceptual environment.

Dr. Liu has conducted and participated in numerous accident investigations and failure analyses, including automotive accidents, industrial and occupational injuries, slip-trip-fall and other pedestrian-related incidents, analyses on the effectiveness of warning labels, Standard Operating Procedures, and other instructional materials. Additionally, he has extensive experience in designing and conducting human behavioral studies, both in-lab studies as well as usability testing in industry. At ESi, Dr. Liu works closely with human factors, biomechanics, automotive, and safety industries.

Dr. Liu is an active member of the Vision Science Society and has published numerous studies in peer-reviewed journals and presented at conference proceedings.

Positions Held

Engineering Systems Inc., Ann Arbor, Michigan

- Senior Staff Consultant, 2024 – Present

Exponent Inc., Atlanta, Georgia

- Scientist, Human Factors, 2022 – 2024

Publications

Higher-Level Meta-Adaptation Mitigates Visual Distortions Produced by Lower-Level Adaptation New Techniques in Aircraft Accident Investigation

X. Liu. And S.A. Engel, Psychological Science, 31(6), pp. 654-662 (2020)

Later Visual Areas can Adapt to Adapted Input from Earlier Visual Areas

X. Liu, J. Mesik, and S. Engel, Journal of Vision, 18(10), 764-764 (2018)

Xinyu Liu
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Education

PhD, Psychology/Cognitive Neuroscience. 2022

MS, Psychology. University of Minnesota, Twin Cities. 2020

MA, Social Sciences. University of Chicago. 2016

BA, Psychology (Cum Laude). Clemson University. 2014

Areas of Specialization

Visual Perception and Action

Accident Investigation

Industrial and Occupational Injury Investigation

Safety and Warning

Usability Testing

Experimental Design, and Data Modelling

Flicker adaptation and neural transmission speed in the human MC pathway
X. Liu, X. Zhuang, and S. Shevell, Journal of Vision, 16(12), 1225-1225 (2016)

Presentations

Training on groups of similar faces decreases similarity both within and between groups
X. Liu, Y. Li, and S.E. Engel, presented at the Vision Science Society Conference 2021, Tampa, FL, 2021

Professional Affiliations/Honors

Vision Science Society

- Member, 2015 - Present

Human Factors and Ergonomics Society

- Member, 2022 - Present

Project Experience

Investigations

Human Factors Analyses of Accidents – Motor Vehicles, Vehicle/Pedestrian, Workplace accidents

- Investigation of human nighttime operation of motor vehicle, including analyses of human scotopic vision, visual attention and awareness at night, perception and response time analysis, etc.
- Analyses of typical alert and attentive pedestrian behavior in public and/or confined spaces. Pedestrian visual attention, cognitive load, gaze and foot planning, etc.
- Investigation of workplace injuries implementing human factors' principles. Implemented human factors analyses on the affordance of various objects and tools and provided expert opinions on typical human interactions with these tools, including door handles, power tools and tool guards, harnesses, forklifts and larger machinery such as rock crushers, cotton harvesters, etc.

Slip, Trip and Fall Accidents

- Provided human factors analyses on conspicuity of obstacles and objects placed in path of travel.
- Investigated human behavior and interaction with the surrounding perceptual environment, including human visual attention, eye movement, foot planning, etc.

Warnings and Informational Texts

- Provided human factors analyses on the overall efficacy of warning labels and informational texts within manuals, user guides, etc. Offered expert opinions on the conspicuity, style, and other aspects of warning information.
- Provided expert opinions on human information processing (or lack thereof) with warnings and informational texts. Analyzed how typical alert and attentive human readers process and interact with various warning information.

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Product Design and User Experience Testing

Usability Testing of Extended Reality Systems – Altered Reality (AR) and Virtual Reality (VR)

- Designed psychophysical experiments evaluating the comfort level of AR and VR systems. Tested how human users interacted with AR and VR systems, specifically analyzing eye movements, head pressure and evaluating performance of the system while users engage in a variety of activities such as visual search, working memory tests, navigating past obstacles, etc.