



School of Planning, Design
and Construction
MICHIGAN STATE UNIVERSITY

RESEARCH SEMINAR



Cornelia Asiedu-Kwakyewaa



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Human Ecology Building 315

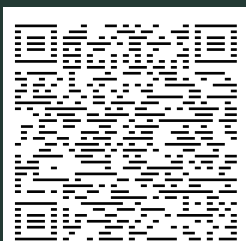


3:30 p.m. - 4:40 p.m.

Cognitive Workload over Visual Processing: Neuroergonomic Effect of Dynamic Speed Feedback Signs

Abstract

Intelligent transportation systems have adopted dynamic speed feedback signs as an effective means of reducing speeding; however, their cognitive effects on drivers remain limited. This study presents a neuroergonomic comparison of dynamic speed feedback signs versus traditional signs using continuous 24-channel EEG data collected during high-fidelity VR-based driving simulation. Results show that dynamic signs generated a more specific and sustained cognitive load, marked by increased Theta power across a fronto-centro-temporal network associated with executive function, perceptual processing, and sensorimotor readiness. No significant differences were found in the Alpha, Beta, or Gamma bands, indicating a targeted increase in workload rather than general spatial or visual attention. Additionally, this heightened cognitive state also persisted after the drivers' sign was passed. These findings provide objective evidence that dynamic signs actively engage drivers' in a real-time feedback loop and offer guidance for designing transportation technologies that are both effective and cognitively safe.



Please contact Dr. Zhao at dz@msu.edu for more information.

Bio

Cornelia Asiedu-Kwakyewaa is a PhD student in the Construction Management program at Michigan State University. She conducted an EEG-based driving and cognitive workload studies, examining how neurophysiological responses can inform human-centered transportation design, driver behavior, and safety-related decision-making. Her research also explores collaborative learning and undergraduate student engagement in virtual environments in engineering and construction education. Cornelia's interdisciplinary work reflects a broader commitment to understanding how technology, behavior, and learning intersect across both transportation and construction education domains.