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LECTURE: UNDERSTANDING AND ENHANCHING THE INTERCONNECTIONS BETWEEN HUMAN EXPERIENCE AND THE BUILT ENVIRONMENT

Part of “The future of Infrastructure today!” UC Berkeley CSI Webinar Series

MAIN SPEAKER

Carol C. Menassa, PhD, F. ASCE

Professor and John L. Tishman Faculty Scholar
Department of Civil and Environmental Engineering
University of Michigan

Friday March 7, 2025
9:00-10:00am Pacific Standard Time

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Webinar Description

The lack of human-centric built environments can lead to problems such as sick building syndrome, lack of productivity, challenges in navigating unknown spaces and other difficulties that affect people of different abilities. Existing human-in-the-loop methods use intermittent human feedback and lack actionable methods for robust human status evaluation, preference identification and improvement of experience throughout life cycle phases of the built environment. Designing assistive robotic systems that are responsive to human status and needs in the built environment has the potential to solve these problems. In this presentation, I will discuss the work that my group is doing to enable independent mobility in people with physical disabilities (PPD). PPD who rely on wheelchairs in their daily activities, encounter several barriers to mobility in the built environment. A typical end-to-end (E2E) mobility scenario involves navigation (i.e., finding accessible routes) and maneuvering tasks (i.e., parking wheelchair in confined spaces). These scenarios demand substantial effort and pose safety and anxiety risks for PPD adversely affecting their quality of life. Prior research has had limited success in creating user-centered autonomy to enable PPD to independently control their E2E travel needs. My research group's work on this project has resulted in frameworks that address the fundamental aspects of indoor path-planning, particularly in the context of considering human preferences or physical and social constraints present in the built environment. First, the work develops fundamental rules for creating indoor global and local planner algorithms that enable a shared control navigation platform capable of integrating human preferences in the navigation space. Second, my group has been exploring how brain computer interfaces (BCI) can further enhance the shared control experience in two ways: by allowing individuals to contribute to identifying inaccessible attributes in the built environment during their daily travel and integrate that information into any navigation algorithm; and by developing a BCI that allows PPD to control the speed of their wheelchair in the built environment giving them greater flexibility for hands free navigation.

About the Speaker

Carol C. Menassa, PhD, F. ASCE
Professor and John L. Tishman Faculty Scholar, Department of Civil and Environmental Engineering
University of Michigan

Carol C. Menassa directs the Intelligent and Sustainable Civil Infrastructure Systems Laboratory at U-M. Her research focuses on understanding and modelling the interconnections between human experience and the built environment. Her research group designs autonomous systems that support wellbeing, safety and productivity of office and construction workers of different abilities and provides them opportunities for lifelong learning and upskilling. Carol has more than 150 peer reviewed publications. Carol previously served as a member of the Board of Governors of the American Society of Civil Engineers Construction Institute (ASCE-CI), and as chair for the ASCE Construction Research Congress Executive Committee. Carol is currently chair of the ASCE-CI Awards Committee and Associate Editor for the ASCE Journal of Computing in Civil Engineering. Carol was elevated to a Fellow of ASCE in 2023. Carol is the recipient of the 2023 ASCE John O. Bickel Award, the 2022 ASCE Walter L. Huber Civil Engineering Research Prize, the 2021 ASCE Arthur M. Wellington Prize, the 2021 ASCE Collingwood Prize, the 2017 ASCE Daniel Halpin Award, 2017 ASCE Alfred Noble Prize, 2017 Outstanding Early Career Researcher from Fiatech, 2015 CII Distinguished Professor Award and the 2014 US National Science Foundation Career Award. She also received several best paper awards.

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