

DEPARTMENT OF MECHANICAL ENGINEERING

SEMINAR SERIES

General Wall-Climbing Robot for Non-Destructive Inspection of Infrastructure

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Abstract

This presentation introduces the **General Wall-Climbing Robot (GWCR)**, developed by the CCNY Robotics Lab and InnovBot, for automated inspection of concrete bridges. The GWCR integrates autonomous robot control, vision-based localization, and non-destructive evaluation (NDE) technologies into a single robotic platform. Its hybrid aerodynamic attraction and suction adhesion system provides a unique combination of strong attachment and high mobility on vertical and inclined concrete surfaces. The robot features a modular payload architecture that supports multiple NDE sensors, including ground-penetrating radar (GPR) and impact echo/impact sounding (IE/IS) systems, enabling both visual inspection of surface defects and detection of subsurface deterioration. The platform can safely access hard-to-reach areas, capture high-resolution images, and perform contact-based NDE measurements with minimal human intervention. The presentation also highlights AI-powered inspection software for the automatic detection, localization, and quantification of surface defects such as cracks, spalling, and staining, as well as a 3D GPR imaging system for identifying subsurface anomalies. By fusing data from multiple onboard sensors, the GWCR delivers a comprehensive condition assessment of concrete infrastructure. Field demonstrations have shown that the robotic system significantly improves inspection efficiency while enhancing worker safety, reducing inspection costs, eliminating the need for scaffolding and snooper trucks, and minimizing traffic disruptions.

Speaker Bio

Dr. Jizhong Xiao is Professor and Director of CCNY Robotics Lab at the City College of New York (CCNY), and Co-Founder of InnovBot LLC, a CUNY Spin-off company dedicated to R&D and commercialization of robotic and NDE technologies with application to the inspection of infrastructure. He received Ph.D. degree from the Michigan State University in 2002, He has published more than 200 research articles in peer reviewed journal and conferences. He received NSF CAREER Award in 2007 and CCNY Outstanding Mentoring Award in 2011, Humboldt Research Fellowship in 2013~2015, and Dean's Award for Excellence in 2019.

Date: Thursday, September 10, 2026

Location: Steinman 254

Time: 2:00 PM

Host: Bo Wang

Attendance open to all interested persons

