Designing the Robot and the Room: From Reconfigurable Platforms to Robot-Ready Buildings

RITSUMEIKAN



Speaker: Eduardo Sánchez Cruz
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Date: September 18th, 2026

Time: 15:00-16:00

Venue: Large Conference Room, Core-Station 2F, BKC Campus, Ritsumeikan University, Noji-Higashi 1-1-1, Kusatsu

Invited by: Prof. Shinta Yoshitomi (Dept. Urban and architectural design)

Abstract :

Robots are moving out of controlled settings and into the messy, shared spaces where people live and work — buildings, hospitals, public infrastructure, aircraft. My work sits on both sides of that encounter: designing the machines, and designing the environments they have to operate in. In this talk I will trace that path through a series of built systems: reconfigurable platforms developed at SUTD's ROAR Lab, including a vertical-garden maintenance robot shown at the Singapore Pavilion of Expo 2020 Dubai, a heavy-payload logistics robot developed with a hospital partner, climbing robots for facade and hull work, and a dual-arm platform built explicitly for buildings that offer robots no intelligence at all — one that pushes wheelchairs, opens doors and operates lifts because the building cannot. I will then turn to autonomous field deployment through Project Osprey, a decontamination robot taken from concept to operation with Singapore's public agencies, and to current work automating loose baggage handling inside narrow-body aircraft cargo holds. These experiences lead to a single conclusion, which frames the last part of the talk: the hardest constraint on deploying robots is usually not the robot. It is the environment. Working with Singapore's Building and Construction Authority and the National Robotics Programme, we are developing guidelines and an assessment framework that establish how ready a building is to host robots and what must change for it to go further — so that robot-readiness becomes something an owner can specify, procure and verify, as we already do for fire safety and accessibility.

Biography:

Eduardo Sánchez Cruz is Programme Lead and Senior Researcher at the Urban Robotics Centre, Singapore University of Technology and Design (SUTD), working under Professor Mohan Rajesh Elara. He leads three concurrent programmes: the Robot-Friendly Building programme with Singapore's Building and Construction Authority and the National Robotics Programme; Project Nyala, automating loose baggage handling in aircraft cargo holds; and Project Osprey, an autonomous decontamination robot he took from concept through field deployment with NEA, SCDF and COSEM, and on which he is first author of an IEEE publication.

He was previously Senior Research Engineer at the ROAR Lab, responsible for mechanism design and platform architecture across several reconfigurable robot programmes — among them a vertical-garden monitoring robot exhibited at Expo 2020 Dubai, a 400 kg-payload reconfigurable logistics robot developed with Changi General Hospital, vertical climbing robots for hull and facade work, and a dual-arm assistance platform for buildings without robot-aware infrastructure.

Between those roles he was Senior Validation Engineer at LionsBot International, leading a team of five and owning product compliance for autonomous cleaning robots against IEC 60335, 63327 and 62885-8/9. He began his career in computational fluid dynamics with Fiat Chrysler Automobiles in Mexico City, and holds experience spanning mechanical design and fabrication, sensor integration, ROS2, standards and compliance, and direct engagement with public-sector and industry partners.