UC San Diego

CONTEXTUAL ROBOTICS INSTITUTE

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A partnership between the UC San Diego Jacobs School of Engineering
and the UC San Diego Division of Social Sciences

ROBOTS IN THE REAL WORLD WORKING WITH HUMANS

• AUTONOMY • HEALTHCARE • MANUFACTURING

We are developing robots to serve society in real time, in the real world.

These robotic systems will adapt, evolve and create their own solutions based on the people and situations – the context – they encounter. In addition, these systems must be safe and secure.

TODAY'S CHALLENGES

Our research teams work across disciplines to solve today's pressing robotics challenges. We've aligned UC San Diego's world-class expertise in hardware, software, cognitive science, human-robot interaction, design, machine learning, data science, materials, security, sensors, vision, communications and more.

TOMORROW'S BOTTLENECKS

We think big, and we look far into the future. In collaboration with industry and academic partners, we tackle fundamental bottlenecks and work to open up tomorrow's game-changing robotics capabilities.

LEADERSHIP

Henrik Christensen
Director
Contextual Robotics Institute

Qualcomm Chancellor's Endowed Chair
in Robotic Systems
Computer Science and Engineering
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Todd Hylton
Executive Director
Contextual Robotics Institute

Professor of Practice
Electrical and Computer Engineering
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WE INTEGRATE DISCIPLINES

SENSING + PERCEPTION

- Deep learning and statistical analysis of images and video for object detection, scene understanding and context sensing
- Computational models for recognizing actions and inferring intent and relationships
- Processing of inputs from real-life applications
- Sensing, control and optimization algorithms

COGNITION + COORDINATION

- Distributed decision making and evolution of group behavior despite uncertainty and limited communication
- Embodied Artificial Intelligence
- Synthetic brain architectures
- Methods of coupling high-performance computing and the Internet of Things with local planning and decision making
- Conveying ethical and moral imperatives to robot behavior

MOBILITY + MANIPULATION

- Biologically inspired actuators (limbs) and new materials
- Robust feedback control mechanisms for distributed, noisy, unknown environments
- Models using context to direct safe and appropriate action
- Coordinated fault-tolerant motion of multiple actuators or vehicles despite limited communications and time delays
- Nano- and micro-robotics

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