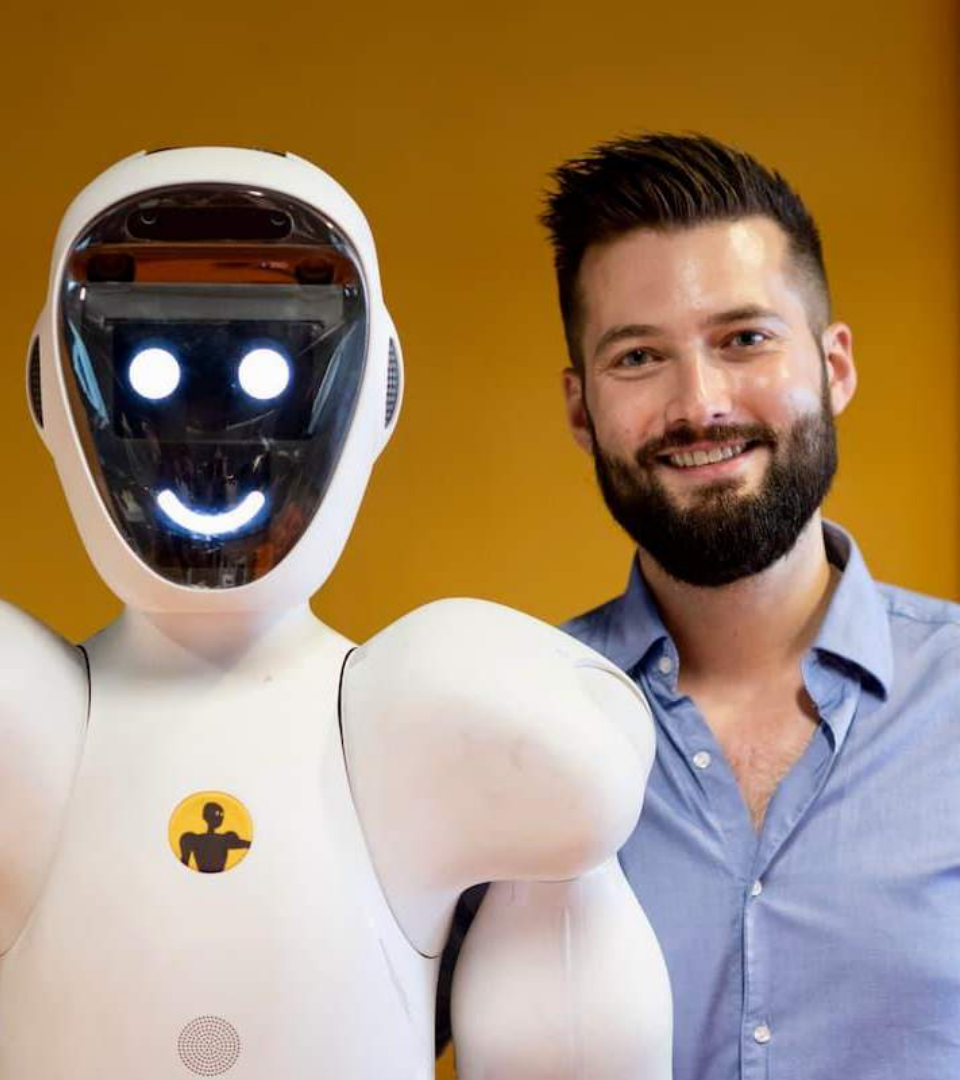
A man and a woman are standing in a laboratory or workshop. The man, on the right, is wearing a dark t-shirt and pants, and is gesturing with his right hand towards the woman. The woman, on the left, is wearing a yellow top and dark pants, and is smiling. In the background, there is a white robot arm with a yellow gripper. The scene is dimly lit, with the text overlaid in white.

Engineering the Future: Real-World Applications of Robotics and AI in Hard Tech

Nicholas Nadeau, Ph.D., P.Eng.



Nicholas Nadeau





No Autonomy

Manual operation and simple devices or systems

Assistance

Human-robot collaboration and light automation

Task Autonomy

Autonomous specific tasks with human supervision

Supervised Autonomy

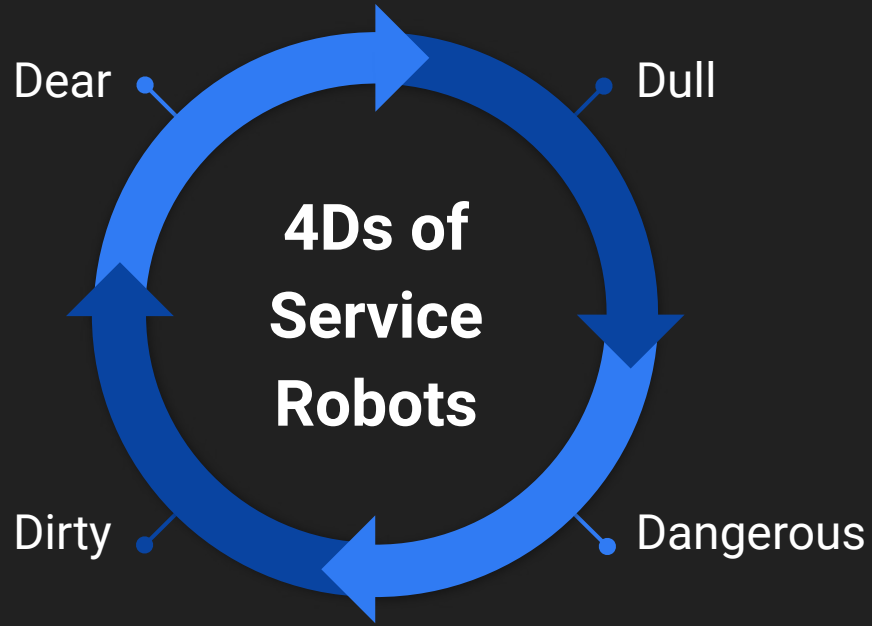
Autonomous applications with human supervision

High Autonomy

Autonomous applications with human approval

Full Autonomy

Completely autonomous with little human oversight



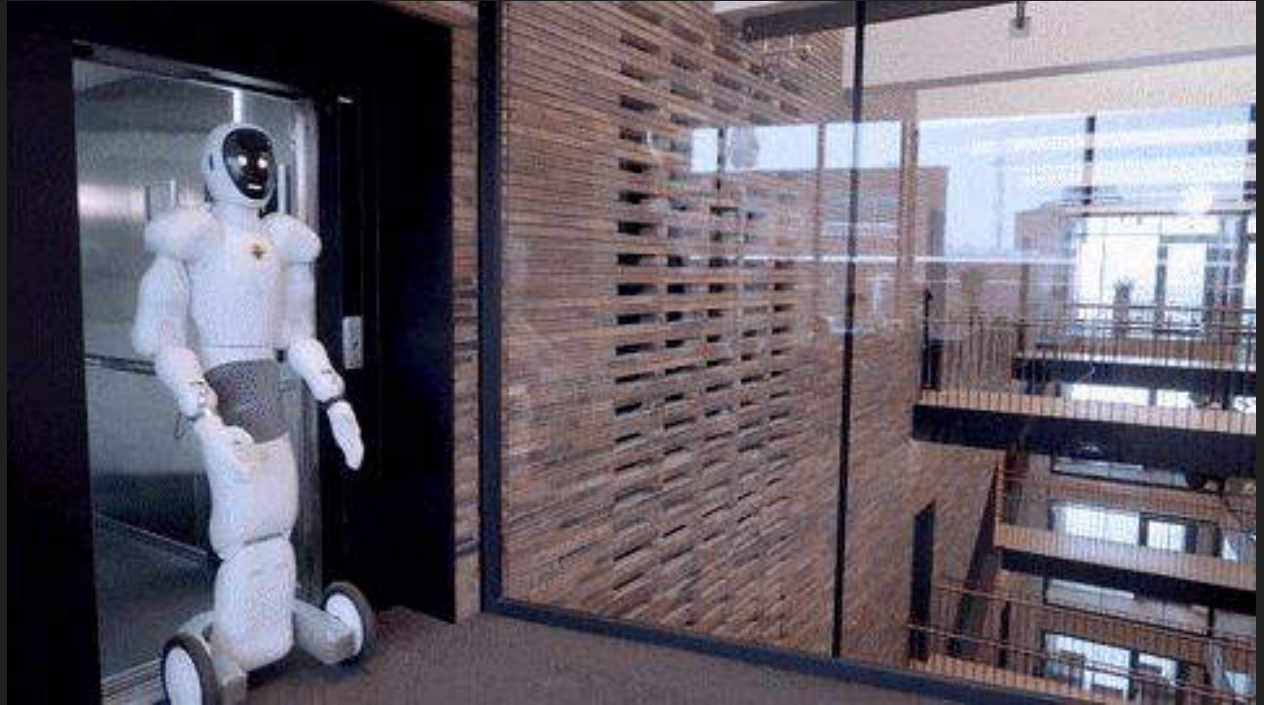
Dull

Tasks that are repetitive
and tedious



Dangerous

Tasks with health and safety concerns



Dirty

Tasks that have an icky or
filth factor



Dear

Tasks that have strict
quality requirements or
cost savings



Declining and Aging Population

Fewer people able to work and more people needing support



Job Market Fluctuations

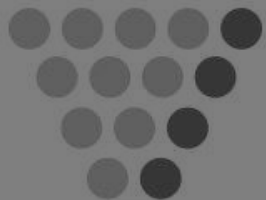
Labour market tightening and labour shortages since the onset of the pandemic



Human Environments

Most jobs are in unstructured environments

A growing worker shortage gap will require new technology



Rogue Research Inc.

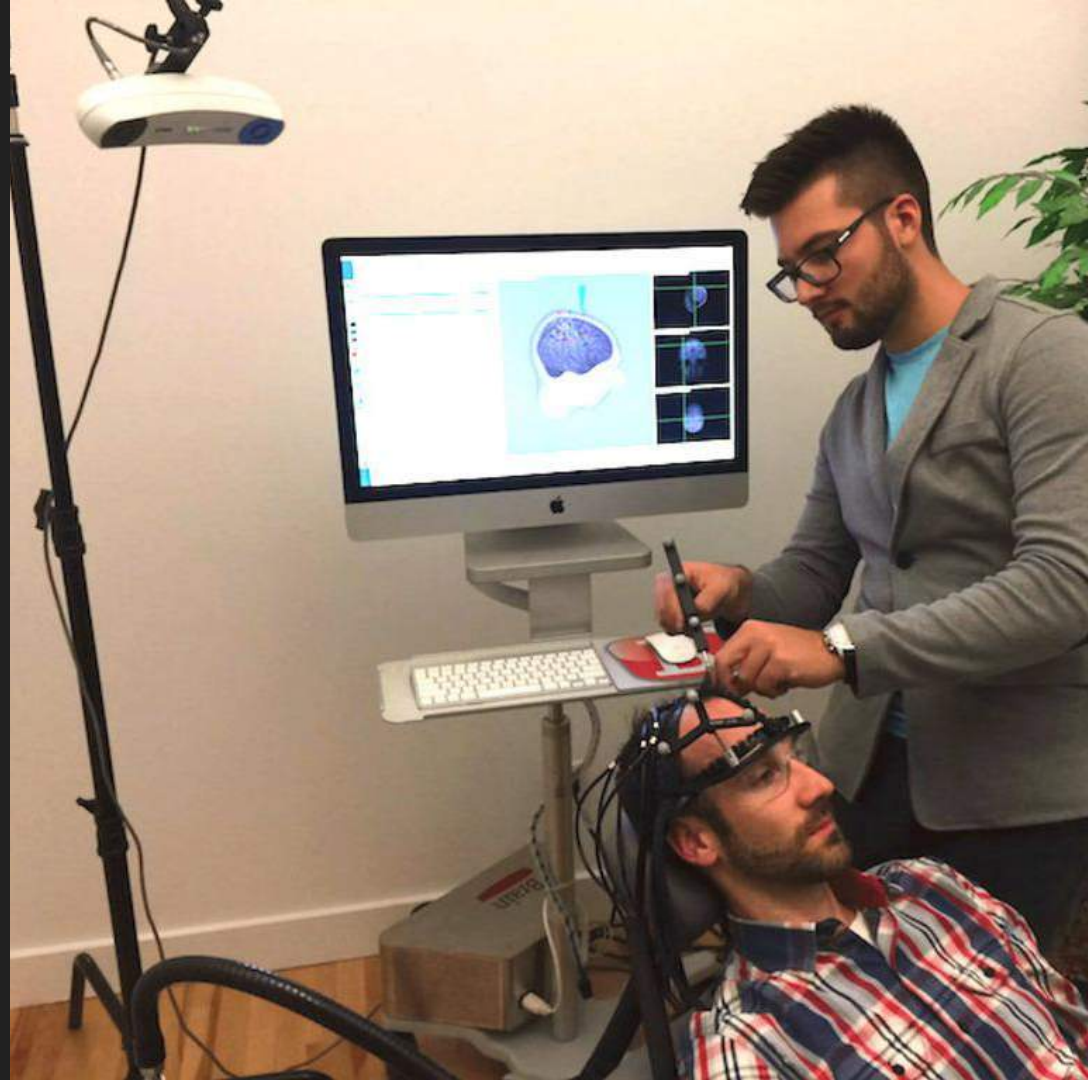
Rogue Research

Brainsight®

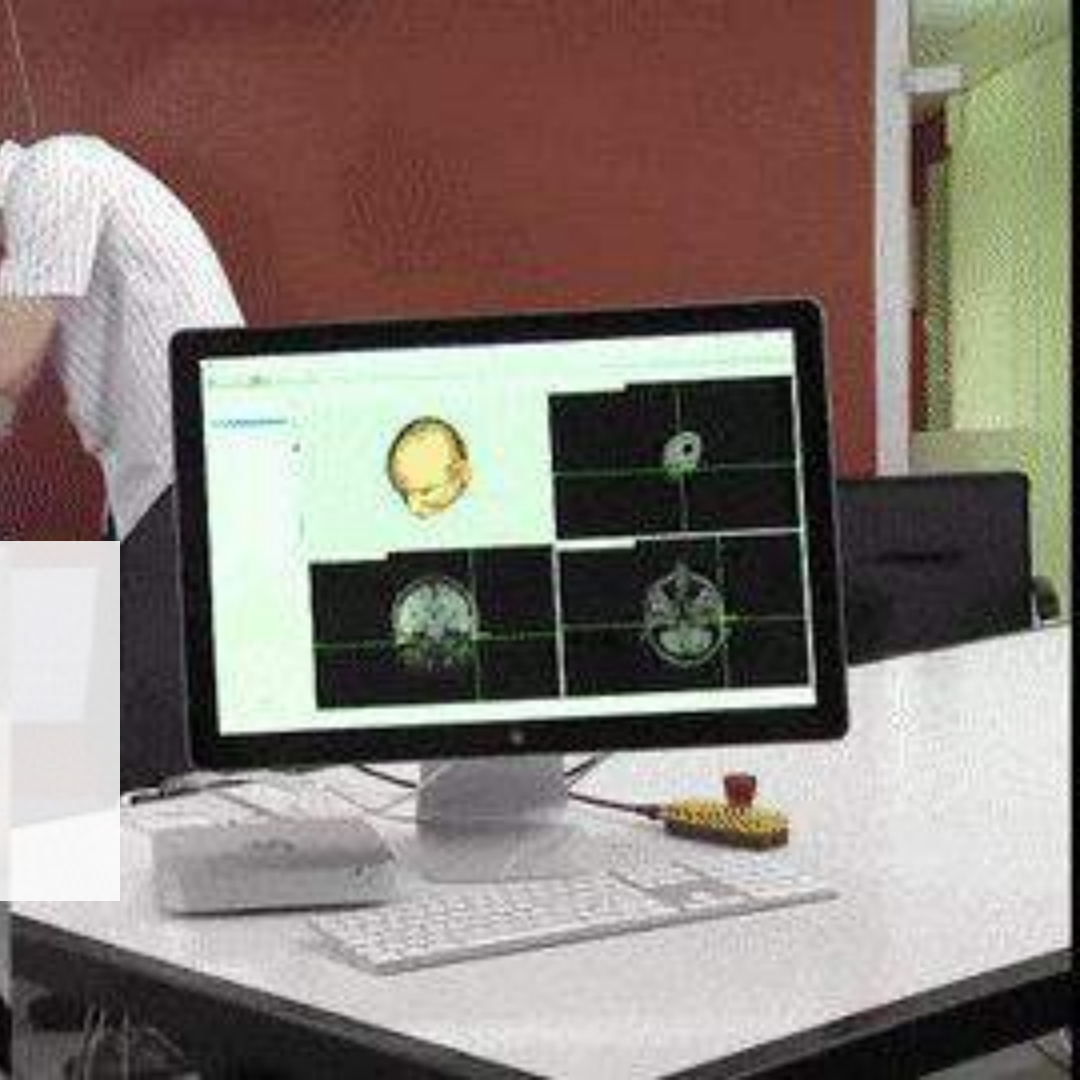
NIRS

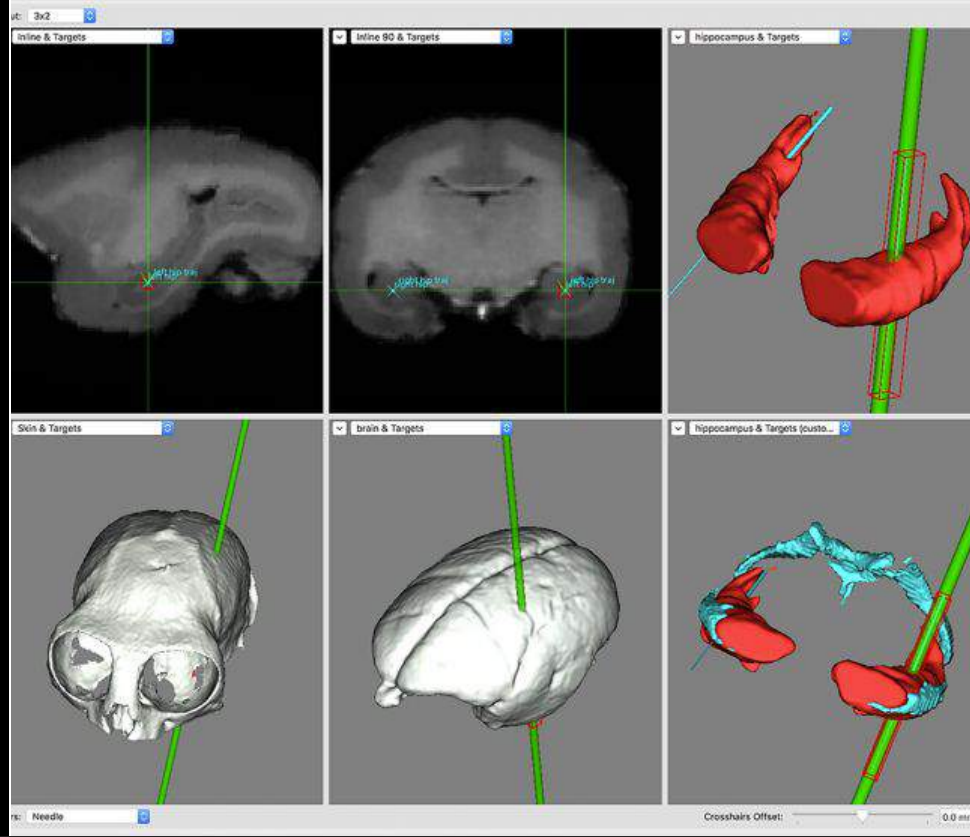


Image-guided Neuronavigation



Robot-guided Transcranial Magnetic Stimulation (TMS)





Veterinary Microsurgery

A large, dark grey 3D printer stands in a workshop. The printer's door is open, revealing the internal printing mechanism. To the left is a grey cart with green bins and a white 3D printed part. To the right is a metal shelving unit and a black office stool. The background is a white brick wall.

AON3D



High-performance Parts

Closed-loop Mechanical Properties



FIRST 3D PRINTED PARTS ON THE MOON

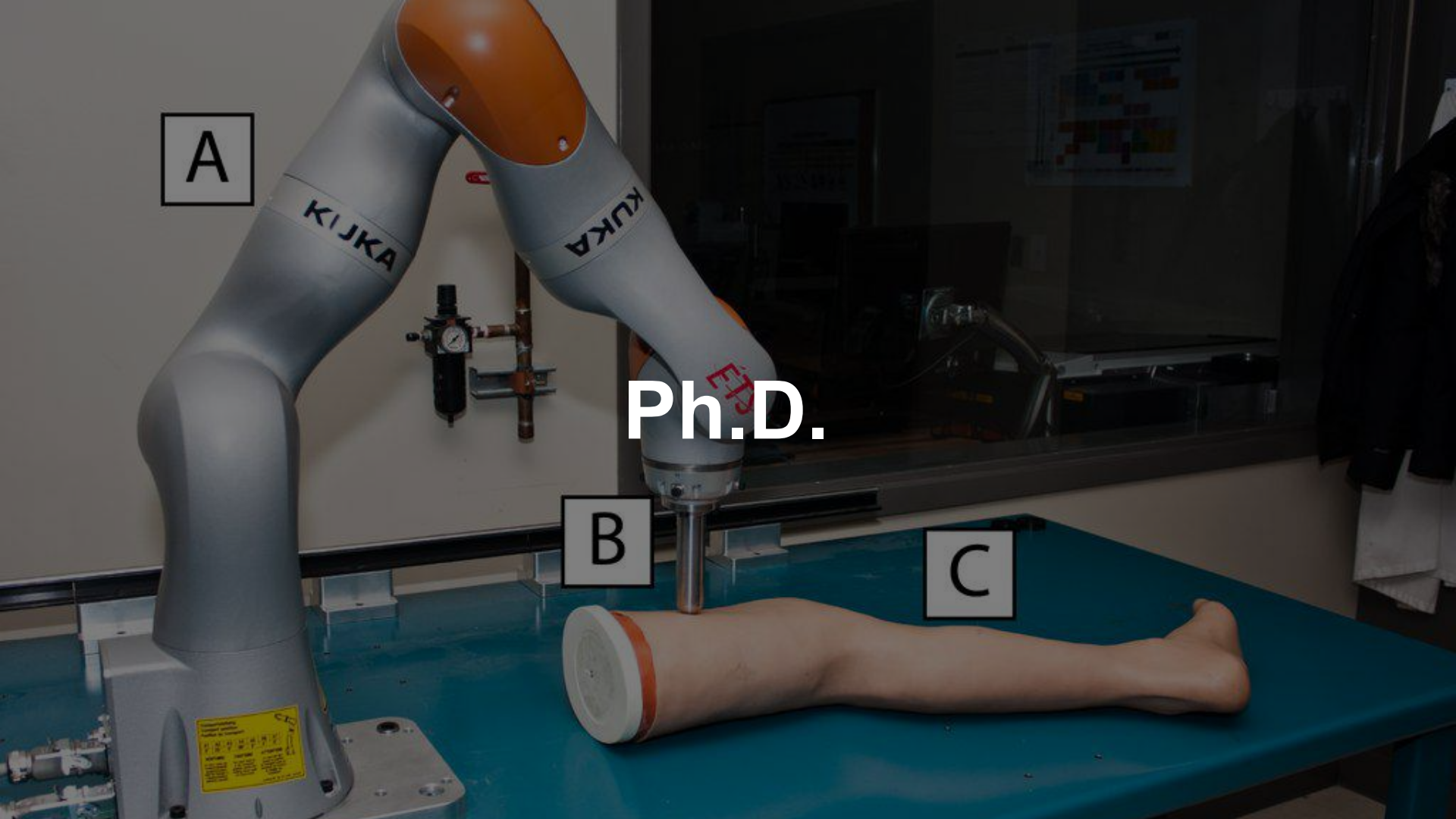


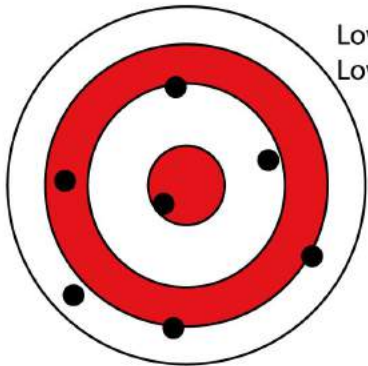
A

Ph.D.

B

C

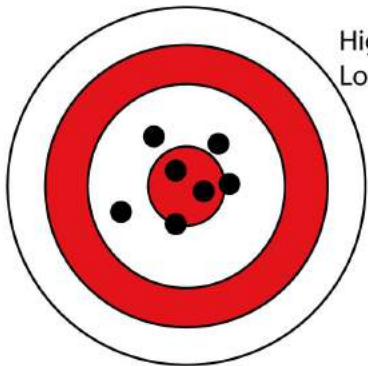




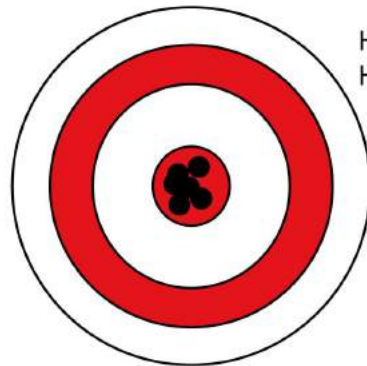
Low accuracy
Low precision



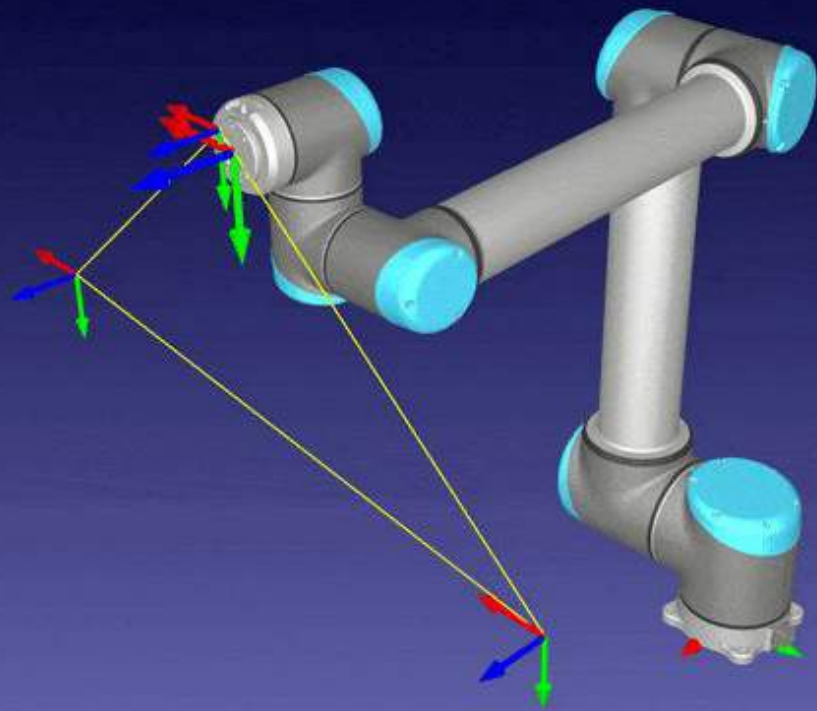
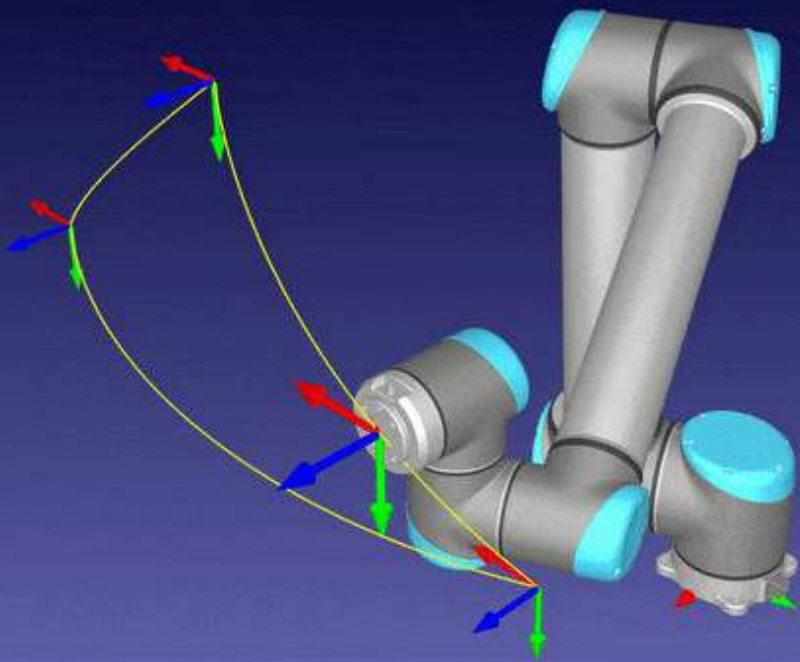
Low accuracy
High precision



High accuracy
Low precision



High accuracy
High precision



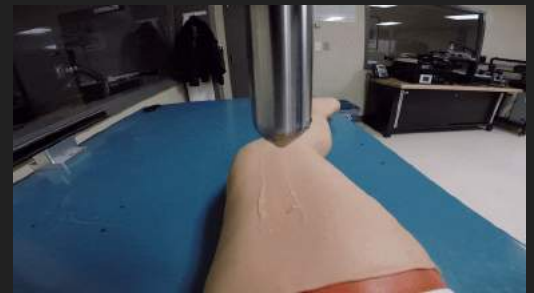
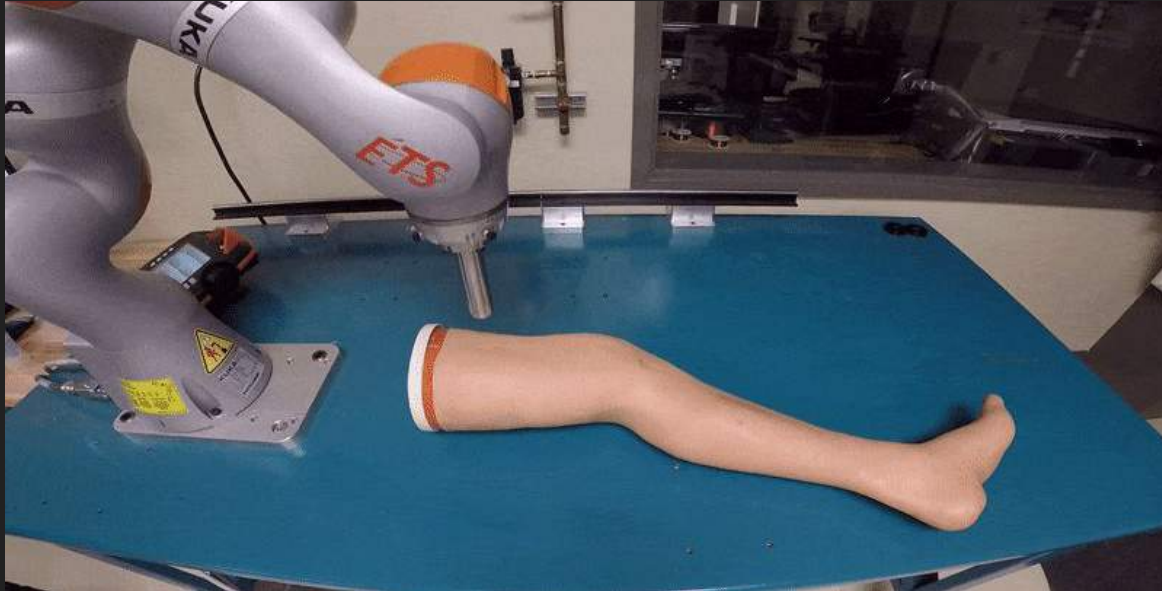
Compliance and Impedance Control



Autonomous Robot Calibration



Evolutionary Motion Control Optimization



MOVE HERE!



gRPC



POINT THERE!



gRPC



FEED ME DATA!



gRPC

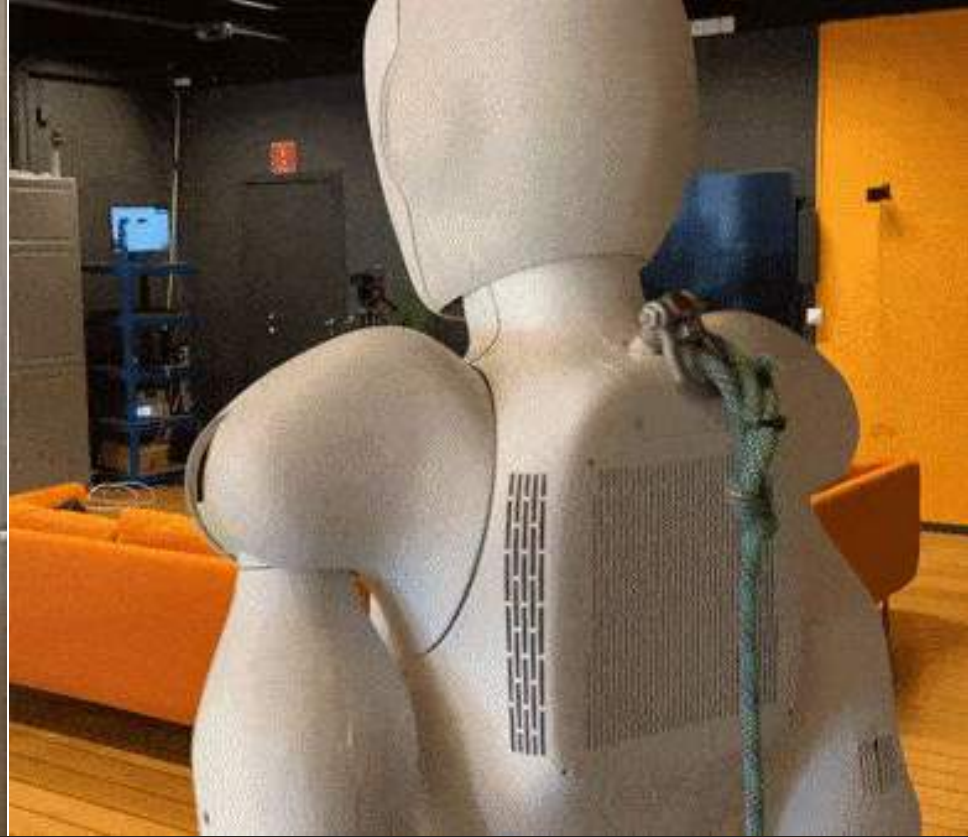
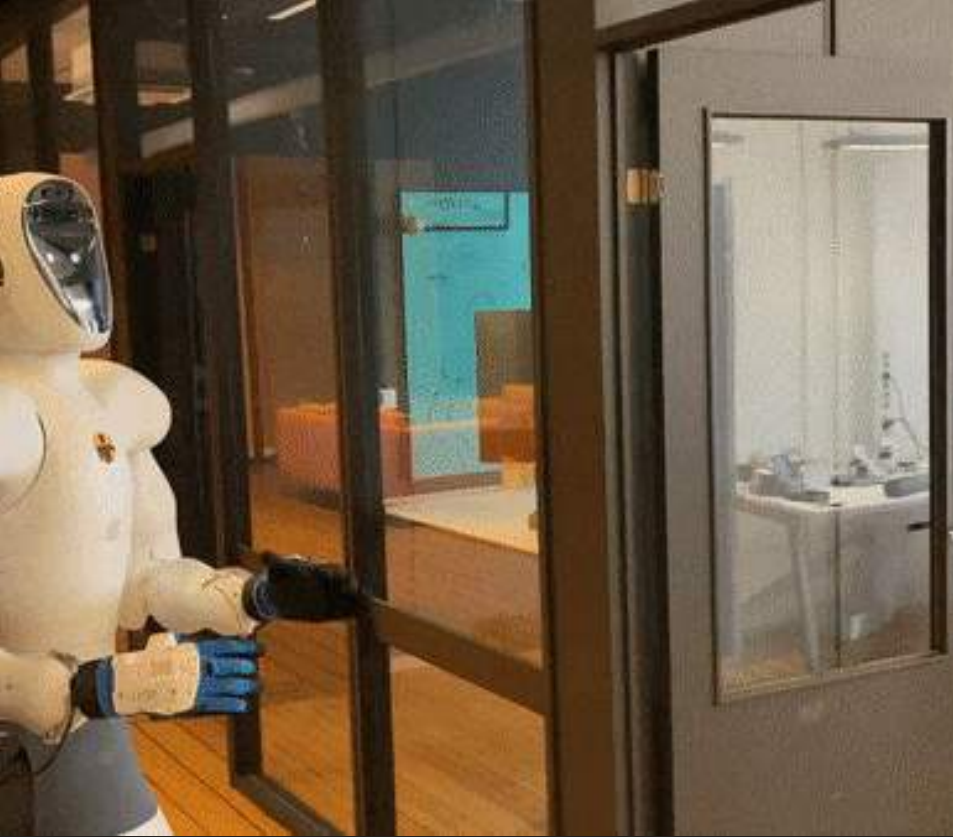


DATA

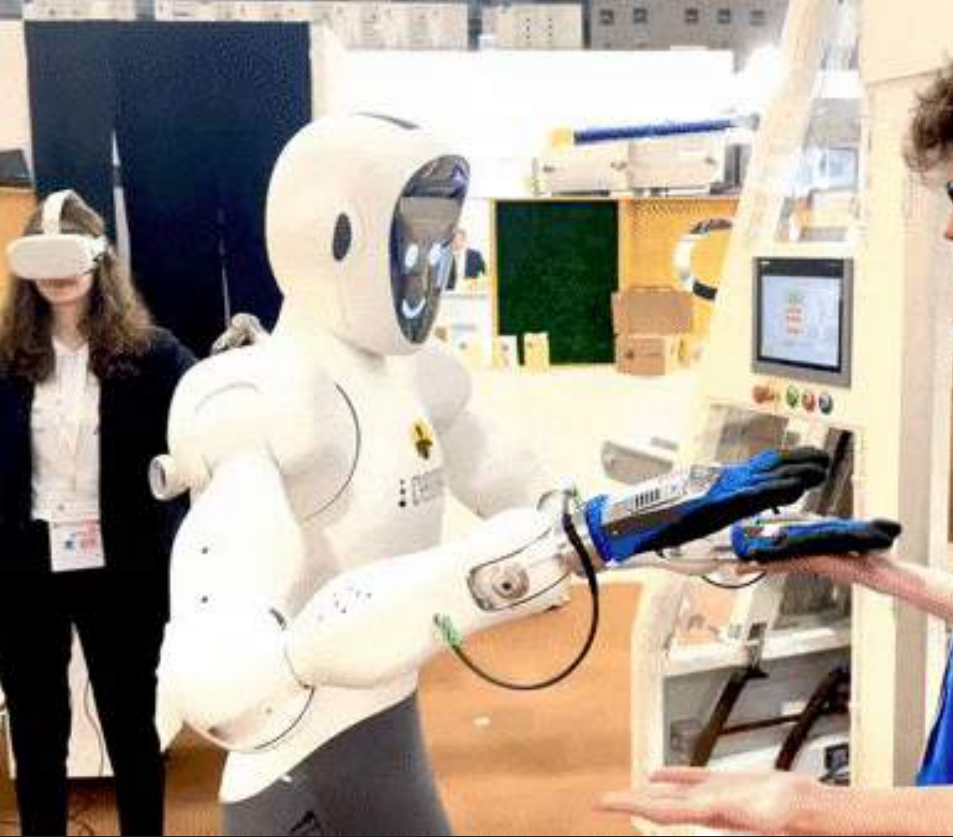


A photograph of three men and a humanoid robot standing together at a trade show. The robot is white and grey with a smiling face. The men are wearing lanyards and badges. The background shows a trade show booth with various displays and signs.

Halodi Robotics



Autonomous Navigation and Interaction



VR/AR Teleoperation

Retail



HOME SECURITY
TRENDS IN 2022 P.23

HOW CORE VALUES SUSTAIN
CUSTOM ALARM'S SUCCESS P.30

CLASSIC TOURNAMENT
P.47

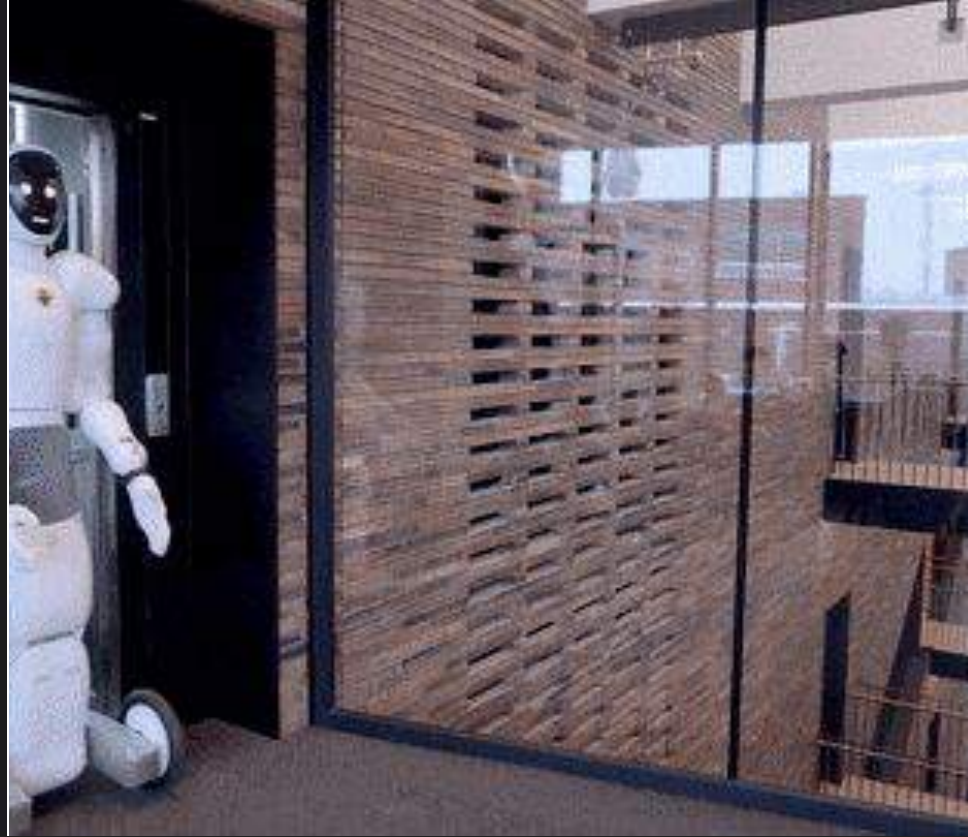
SECURITY NATION

JAN/FEB
2022

SLOWLY
BOT
SURELY



More robotic capabilities and



Security Guarding

Industry 4.0



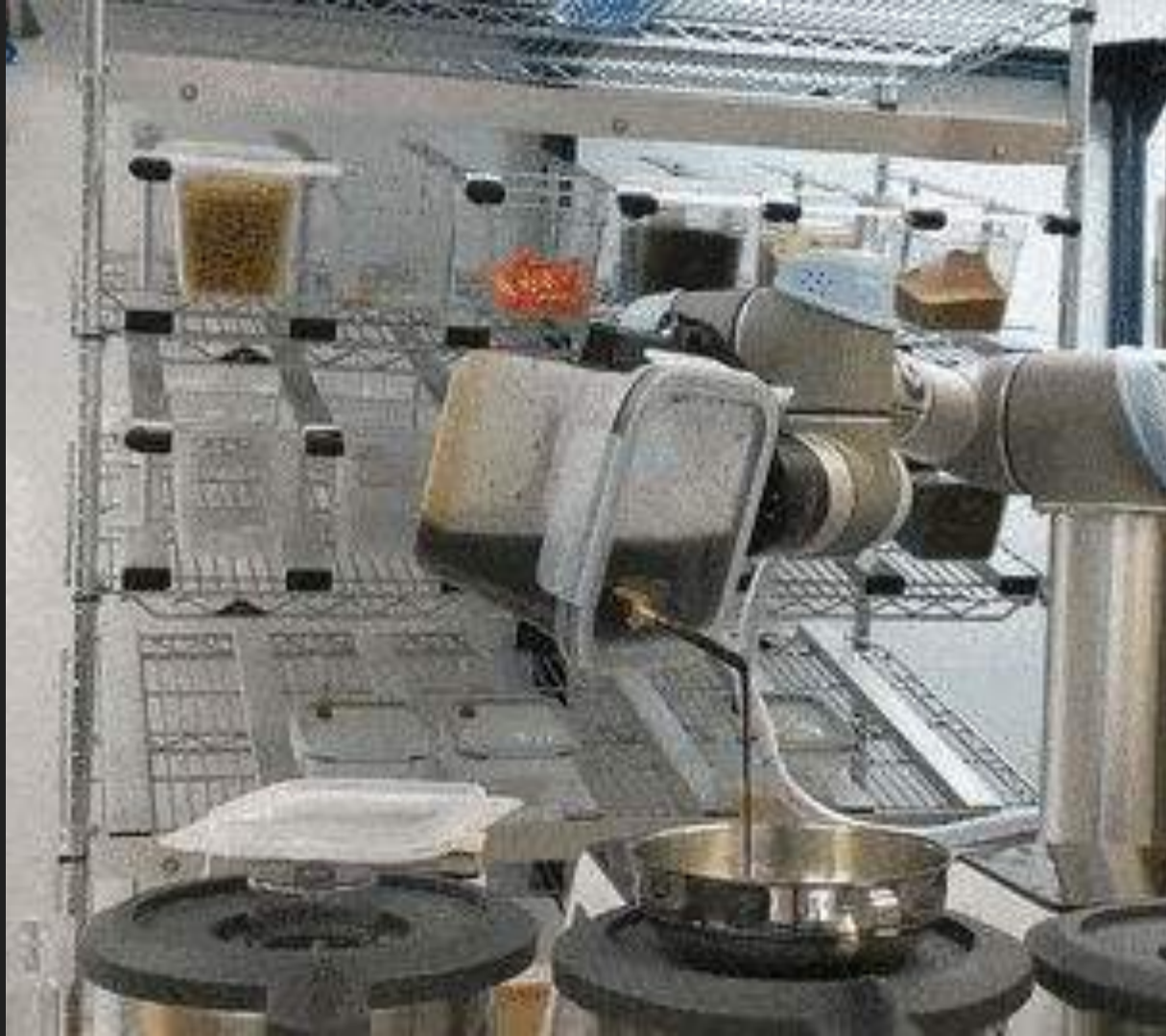


ANA Avatar XPRIZE

A photograph of two men sitting in a workshop. On the left is a yellow and black robotic arm with a camera lens. The man in the center has a beard and is wearing a maroon hoodie. The man on the right has a beard and glasses, wearing a black t-shirt with the word 'OSEDEA' on it, and is holding a game controller. The background features a wall with greenery.

Nadeau Innovations

Jasper (YPC Technologies)



Osedea

C'est ce qui se passe dans
le métro la nuit pendant
que vous dormez



MTL BLOG



Action 4/31 – 39630

Datapoint 2 out of 12

Date	Time	Description	Source
2022-08-24	2:27:20 a.m.	Pan of 32°, Tilt of 26°	spot-cam-ptz



Current

Control

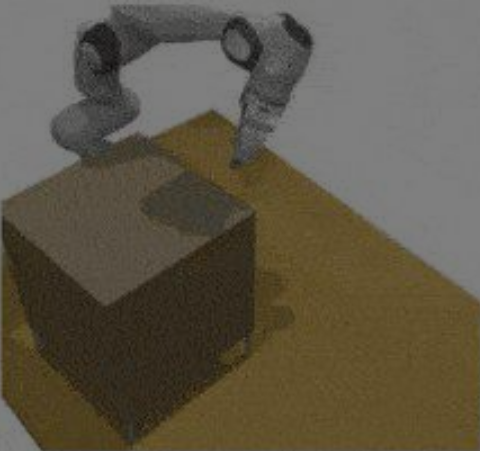
✕ "Graffiti" an

"Graffiti" – 0.9
Reported by: Syst

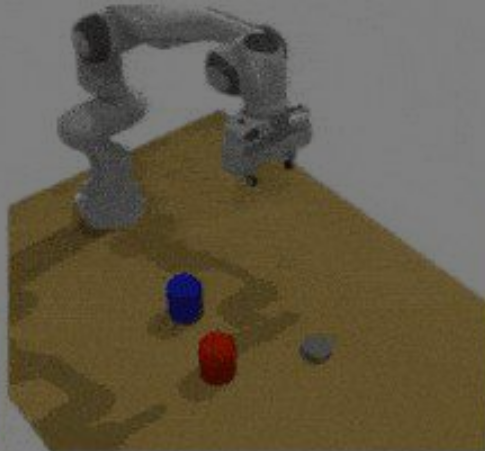
✕ "Graffiti" an

"Graffiti" – 0.9
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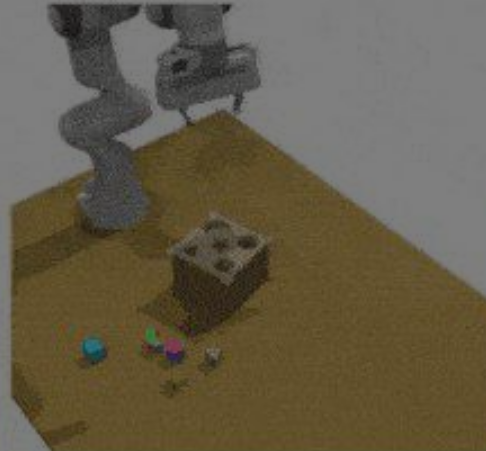
 nadeau
innovations



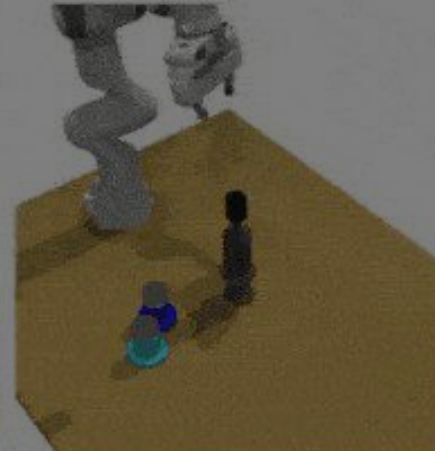
"open the middle drawer"



"close the blue jar"



"put the cylinder
in the top sorter"

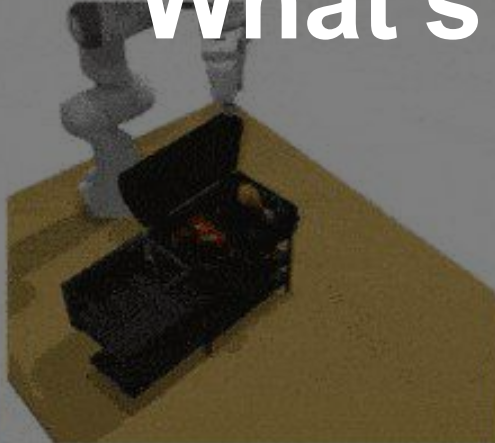


"screw in the
blue light bulb"

What's next?



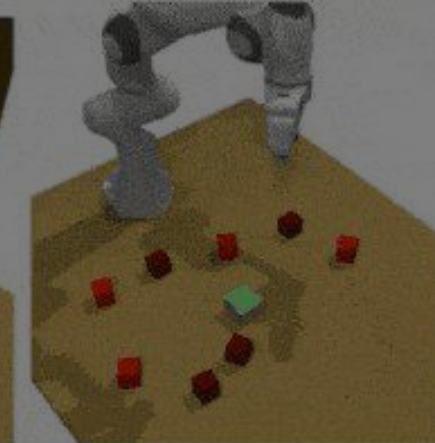
"use the stick to drag the cube
onto the gray target"



"take the steak off the grill"



"put the mustard
in the cupboard"



"stack 2 maroon blocks"



Nicholas Nadeau,
Ph.D., P.Eng.



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NadeauInnovations.com