

Robots thrive where the world stands still. The sea doesn't.

Every offshore task sits somewhere between a structured cell and the open sea: variation in task, object and environment predicts how close it is to deployment.

Prof. Francis wyffels

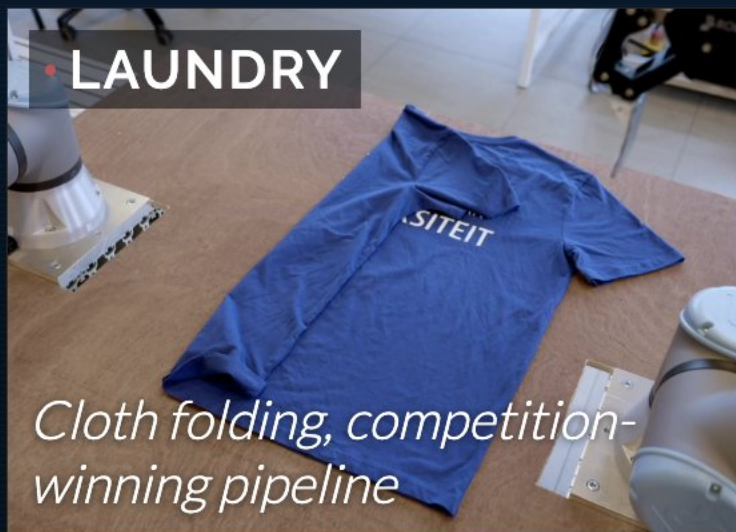
Robotics and AI · IDLab-AIRO · Ghent University – imec



— BEFORE WE START

I come from robotics, not from the sea.

Robots that fold laundry, pour drinks and learn a knife skill from one demonstration.
None of them has ever seen salt water.



— BIO-INSPIRATION

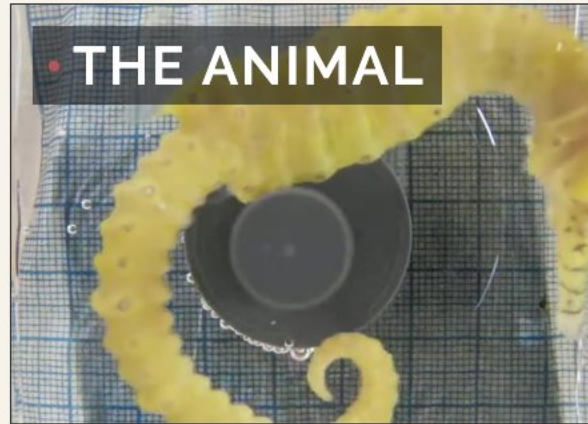
The sea is already in our lab.

SEAHORSE TAIL

The tail combines strength and flexibility: long muscles span up to 11 vertebral segments. We modelled it in simulation, built a prototype, filed a patent.

BRITTLE STAR

Five arms, no brain, one coherent crawl: decentralised control that turns by reassigning arm roles. Published in simulation, printed once for the bench (unpublished), and drawn as an inspection robot for machines nobody wants to stop.



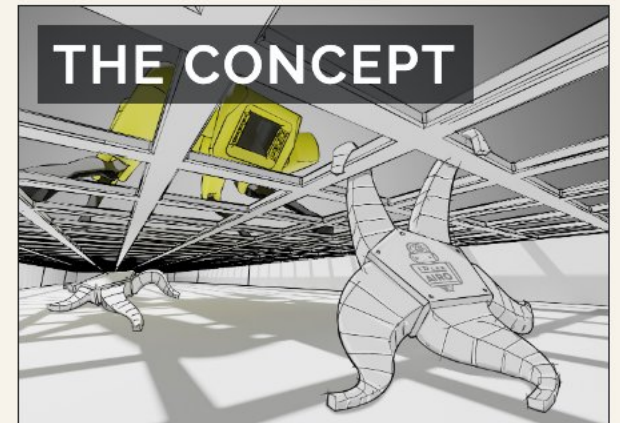
Hippocampus: a tail that grips



Seahorse-tail arm prototype, bending



Learned gait beside the animal



WIDER concept drawing, 2025

— THE QUESTION

Which jobs at sea can
a robot do today?

No ChatGPT moment for robots yet.

NO INTERNET-SCALE DATA

Physical skills have no web to scrape.

ERRORS COST HARDWARE

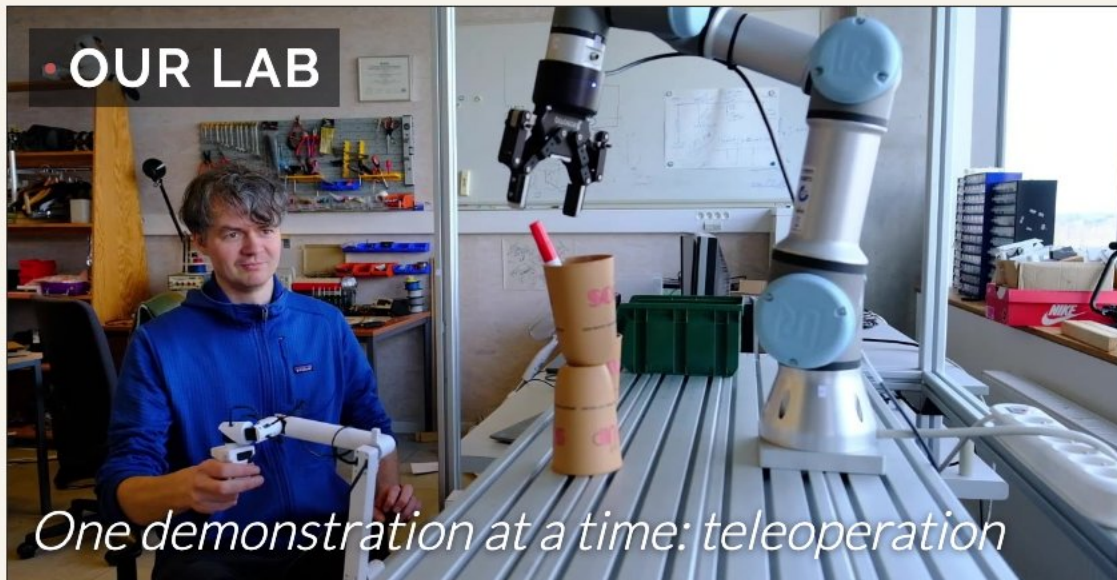
A wrong grasp breaks a part, not a sentence.

SLOW AND EXPENSIVE

Iteration is nothing like software.

EVERY BODY IS DIFFERENT

Skills do not transfer between robots.



Robotics is getting more accessible. Expertise matters more than ever.

STRUCTURED

UNSTRUCTURED

INCREASINGLY HUMAN-DRIVEN • INCREASING OBJECT AND TASK DIVERSITY



STRUCTURED

Fenced cells, deterministic (such as warehouses)

SEMI-STRUCTURED

Cobot cells and robot helpers (such as hospitals)

UNSTRUCTURED

Open floor, humans alongside (such as your home)

STRUCTURED

UNSTRUCTURED

WEATHER, SALT AND ONE-OFF REPAIRS PULL EVERY JOB TO THE RIGHT

01



STRUCTURED

Automated container terminal (Deurganckdok, Antwerp-Bruges)

02



SEMI-STRUCTURED

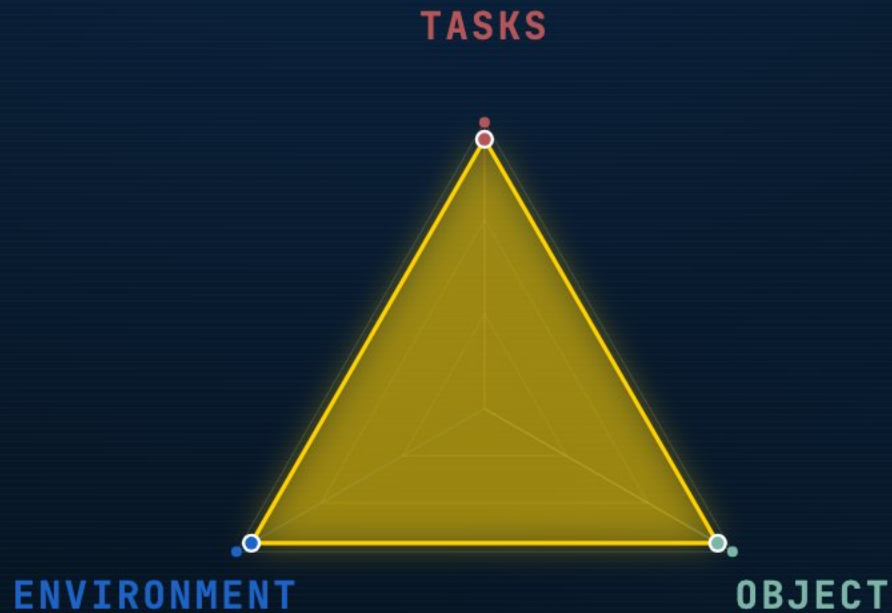
Inside the turbine: known geometry, a technician in the loop

03



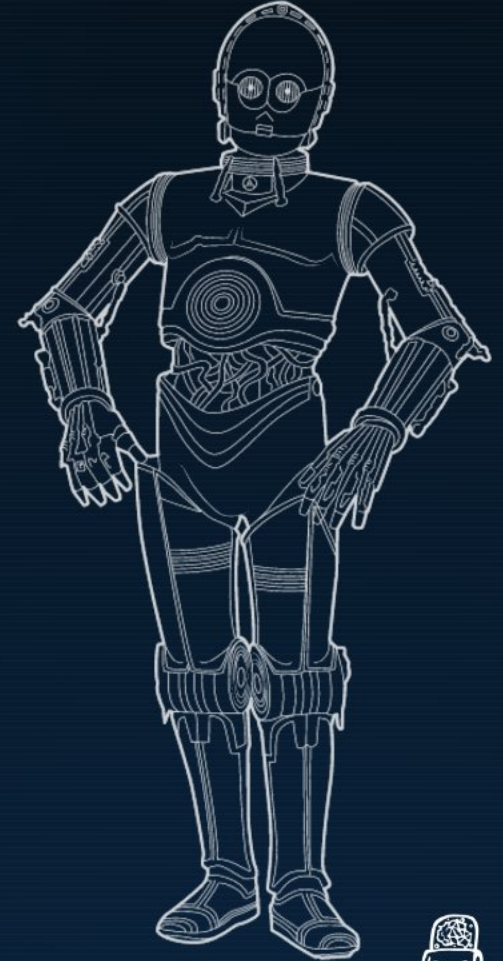
UNSTRUCTURED

On deck: moving cargo, weather, one-off jobs (Les Alizés, Jan De Nul)



The dream:
one robot,
every task,
every place.

Humanoids fill all three
axes at once. The whole
field is chasing this. We are
nowhere near.

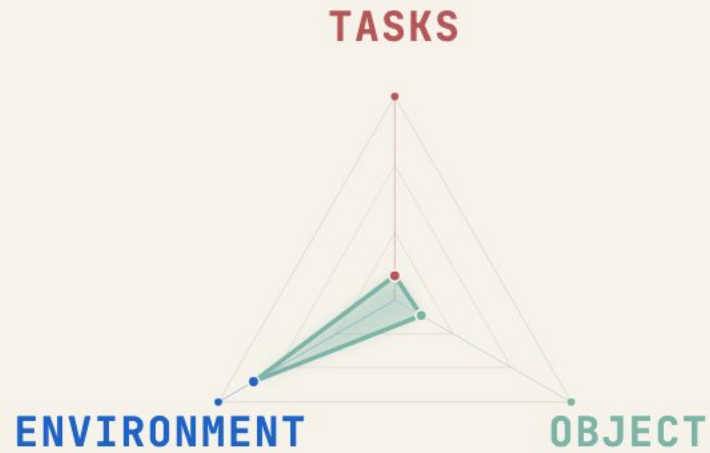




ADVERTISEMENT: SUNDAY ROBOTICS, MEMO (2026)



• A GARDEN



ROBOT MOWER

One task, one object, any garden in any weather

One task.
One object.
Any garden.

It never meets a second job. That is why it works everywhere.

Our robots, plotted honestly.



Pouring into glassware the robot has never seen: 93.6% over 500 autonomous pours, 61 of 62 live in front of a crowd. And our competition-winning cloth system folds end-to-end in 28% of controlled trials. We publish that number ourselves.

• ROBOT WAITER

MEET MOBI



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LIVE

**MOBILE
MANIPULATION ·
DRINK DELIVERY**

*ITF World demo, May
2025 · Featured on VRT
NWS*

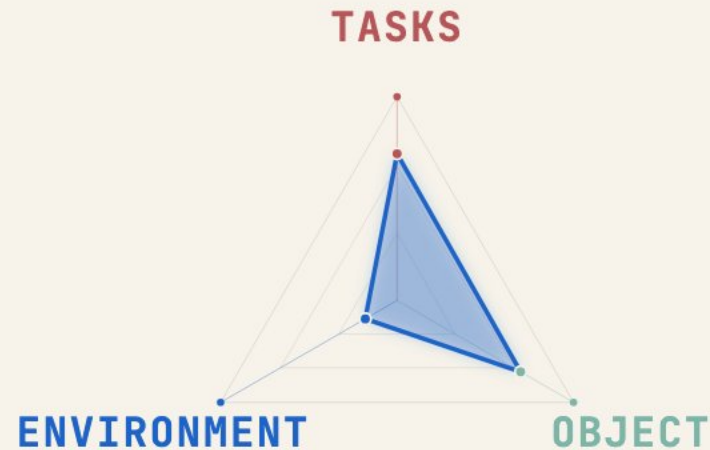


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Inside the turbine,
the room is known.
The job is not.

Fixed geometry, no weather. Every
visit brings another part and another
task.



TURBINE MAINTENANCE

Environment fixed; tasks and objects vary

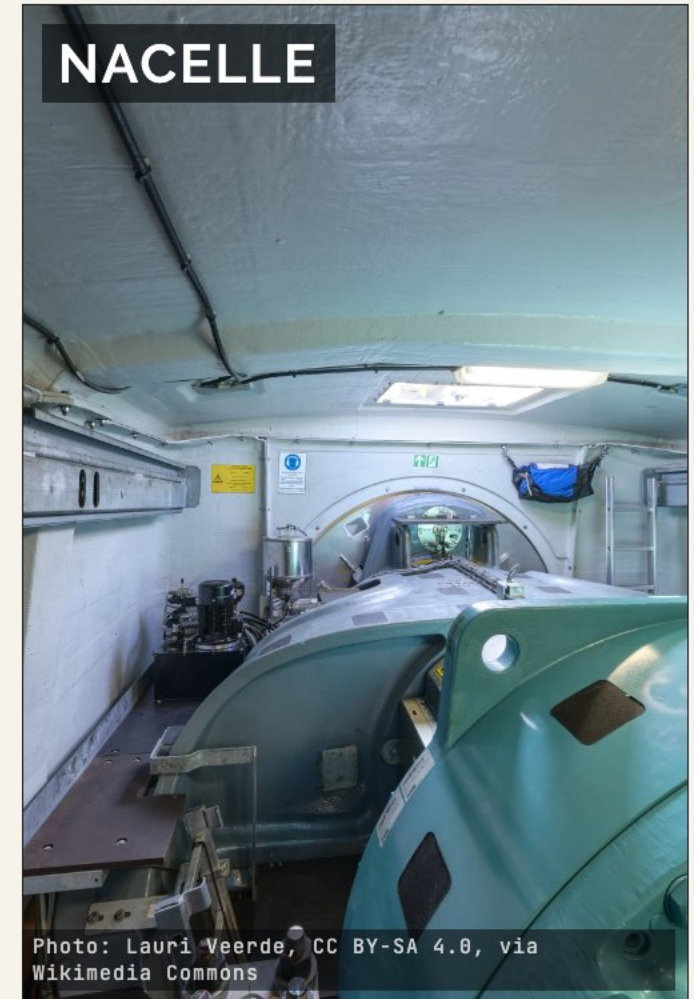


Photo: Lauri Veerde, CC BY-SA 4.0, via
Wikimedia Commons

Generalise by narrowing: every robot at sea picks one axis.



**HULL-CLEANING
ROBOT**



**BLADE-INSPECTION
DRONE**

BELGIAN NAVY · OOSTENDE, DRONE
MOTHERSHIP



Photo: Gloriouswarship, CC0, via Wikimedia Commons

ANTWERP-BRUGES · AUTOMATED
TERMINAL



Photo: Trougnouf, CC BY 4.0, via Wikimedia Commons

ØRSTED · CARGO DRONE, BORSSELE



Photo: Ørsted

BLADEBUG · BLADE WALKER



Image: ØRE Catapult

ROPE ROBOTICS · BLADE REPAIR

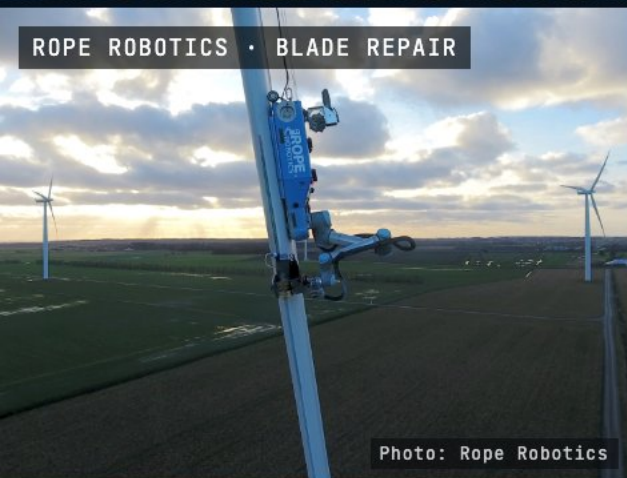


Photo: Rope Robotics

ANYBOTICS · PLATFORM INSPECTION



Photo: ANYbotics

FUGRO · UNCREWED SURVEY VESSEL



Photo: Fugro

JOTUN · HULL-CLEANING ROBOT



Photo: Jotun

FLYABILITY · TANK INSPECTION DRONE



Footage: Flyability

SAILDRONE · OCEAN SURVEY



Photo: NOAA / Saildrone, public domain

OCEAN INFINITY · ARMADA FLEET



Photo: Nolabob, CC BY-SA 4.0, via Wikimedia Commons

NOAA · DEEP-SEA ROV



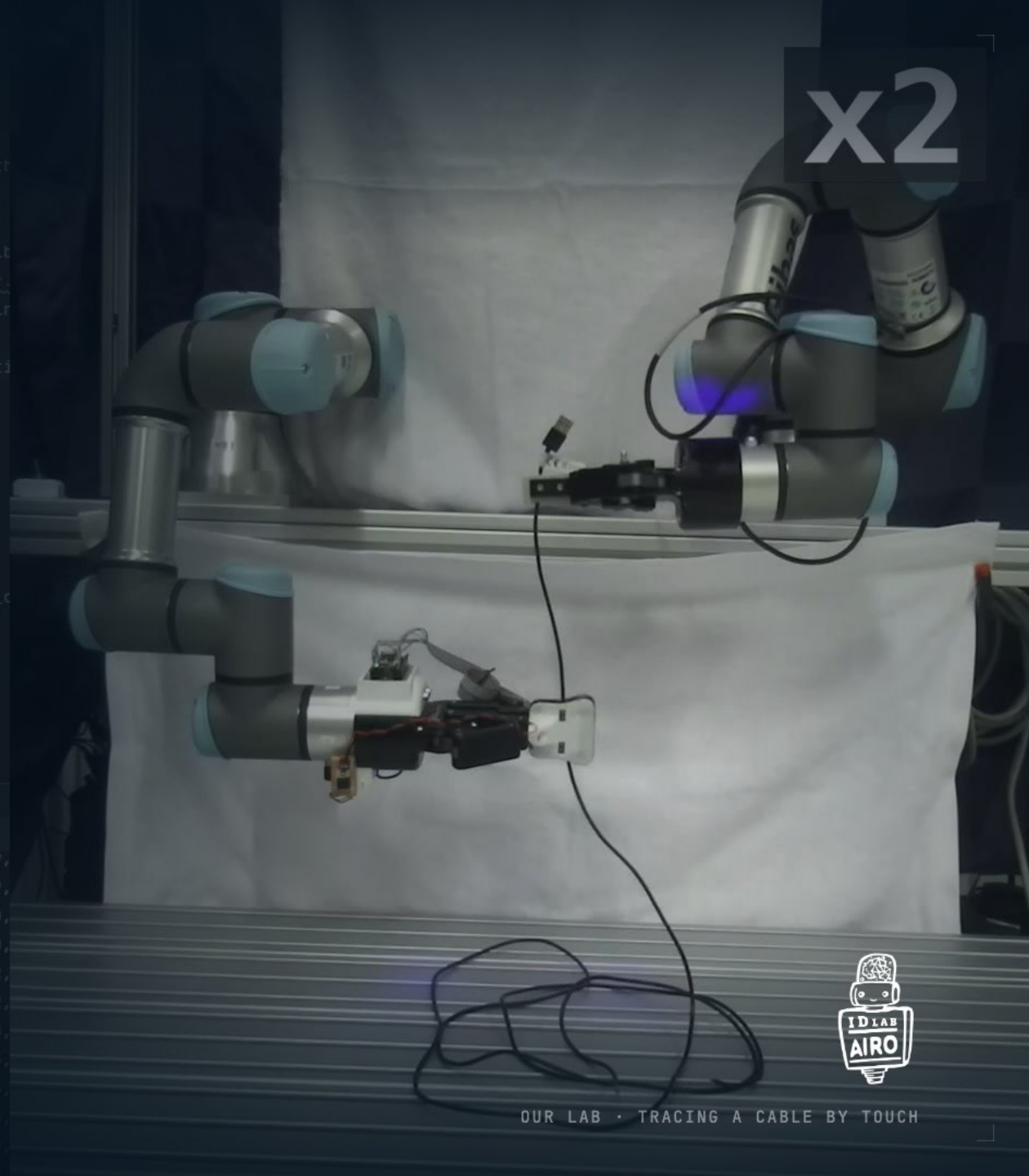
Photo: NOAA Ocean Exploration, public domain

The repair itself is still done by hand.

Gripping, seating, fastening, sealing,
handling a flexible patch in contact.

— That missing step has a name:
manipulation.

x2



THE TAKE-HOME

Three questions before you robotise a job at sea.

01 How structured is the workplace?

The further right on the line, the harder. Sometimes you can move the job left: to the quay, the workshop, a jig.

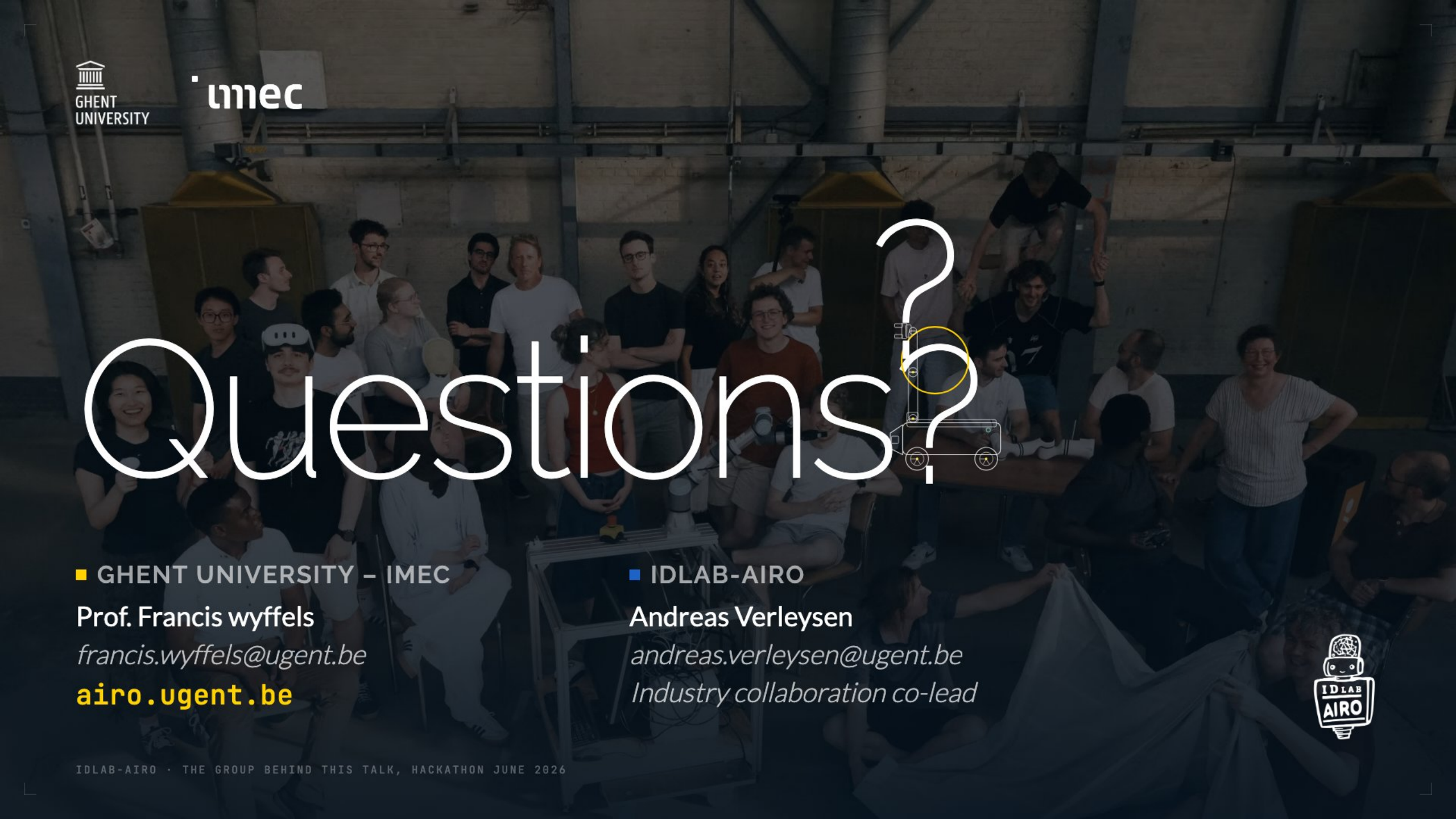
02 Which axis must the robot generalise on?

Tasks, objects or environment. Working robots pick one. If your job needs all three, split the job.

03 Is the work repetitive and high volume?

Then classic automation wins, and we will tell you so. Learning robots earn their keep on varied, contact-rich work.

Questions?



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