Transformation of international grocery ecommerce through the Ocado Smart Platform

Dr David Sharp
Head of Ocado Technology 10x

david.sharp@ocado.com
07880 052 064

/OcadoTechnology

Copyright © Ocado 2021

ICT and AI Summit
18/03/2021
10:00 – 11:30
Hertfordshire Chamber of Commerce
Webinars

THE Businesses COMMUNITY ST.ALBANS

Contents

- **Introduction to Ocado**
- ICT and AI at Ocado
- Picking robotics
- Delivery robotics

/OcadoTechnology

Copyright © Ocado 2021

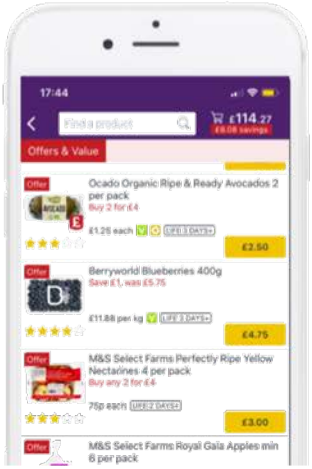
ocado TECHNOLOGY

Introduction to… ocado GROUP

50% — London Stock Exchange 2010 — 100%

ocado

M&S



ocado SOLUTIONS

Casino Sobeys Kroger Morrisons ICA

AEON coles bp bon prau M&S ocado

ocado TECHNOLOGY

ocado ENGINEERING

ocado SMART PLATFORM™

/OcadoTechnology

Copyright © Ocado 2021

Ocado Group is 20 years old: market capitalization 18-£20 billion

Roughly £2m - £2.5m more valuable every day since starting!

Introduction to…

Ocado.com (Ocado Retail Limited) [2020 figures]

- £2.1 billion retail sales (up 35% in a year)
- 330,000 orders per week. 680,000 customers.
- 60 items per order. Average > £100 per order.
- 20m grocery items picked per week
- 50,000 items in catalogue
- 99% order accuracy
- 0.4% wasted food

Dordon (2013): 350k sq ft = 5 football pitches in 35-acres

Massive warehouses (UK) with automated goods-to-man picking

Conveyors: Hatfield, Dordon

Robots: Erith = 563k sq feet (>7.5 football pitches)

2021: Bristol, Purfleet, Andover

Copyright © Ocado 2021

Introduction to… ocado TECHNOLOGY

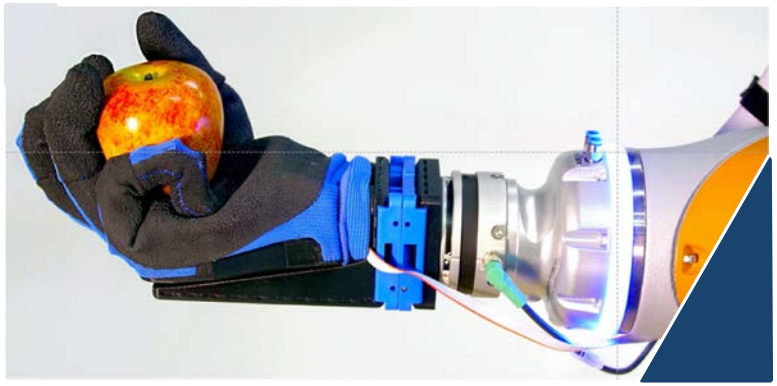
Technology pioneers

World-leading innovator in ecommerce, robotic warehousing and smart logistics

- 2,000+ engineers - software, electronics, mechanics, robotics, data science
- Cutting-edge technologies – artificial intelligence, machine learning, swarm robotics, simulation/digital twins, internet of things (IoT), clouds
- 11 development centres: Hatfield, London, Krakow, Wroclaw, Barcelona, Sofia, Stockholm, San Francisco, Toronto and Las Vegas

Information Tech

- Software
- Simulation
- Box moving robots
- Picking robots
- Data science
- Apps/ecommerce
- Logistics



Artificial Intelligence

- Optimisation algorithms
- Supervised machine learning
- Imitation learning
- Reinforcement learning
- Neural network architectures

/OcadoTechnology

Copyright © Ocado 2021

Contents

- Introduction to Ocado
- **ICT and AI in the Ocado Smart Platform**
- Picking robotics
- Delivery robotics

/OcadoTechnology

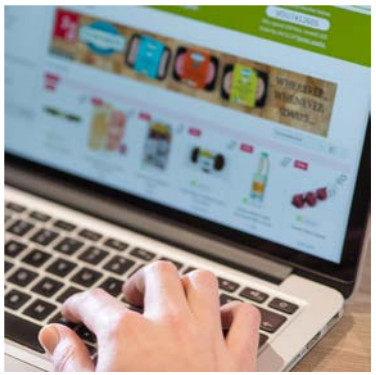
Copyright © Ocado 2021

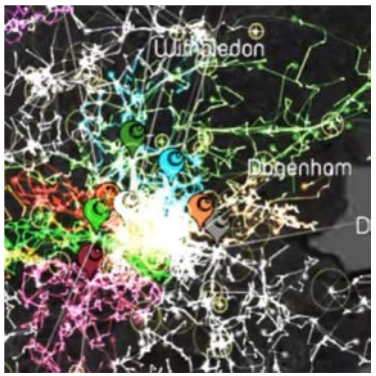
The Ocado Smart Platform

The most advanced eCommerce, logistics and fulfilment platform for groceries in the world.

Modular and scalable

- Web-shop and mobile apps
- Automated fulfilment
- Store pick
- Routing and deliveries



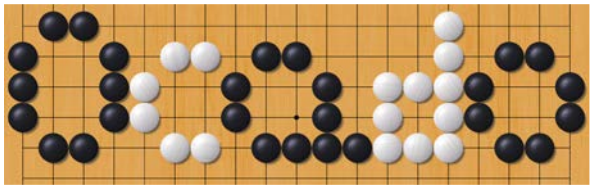


/OcadoTechnology

Copyright © Ocado 2021

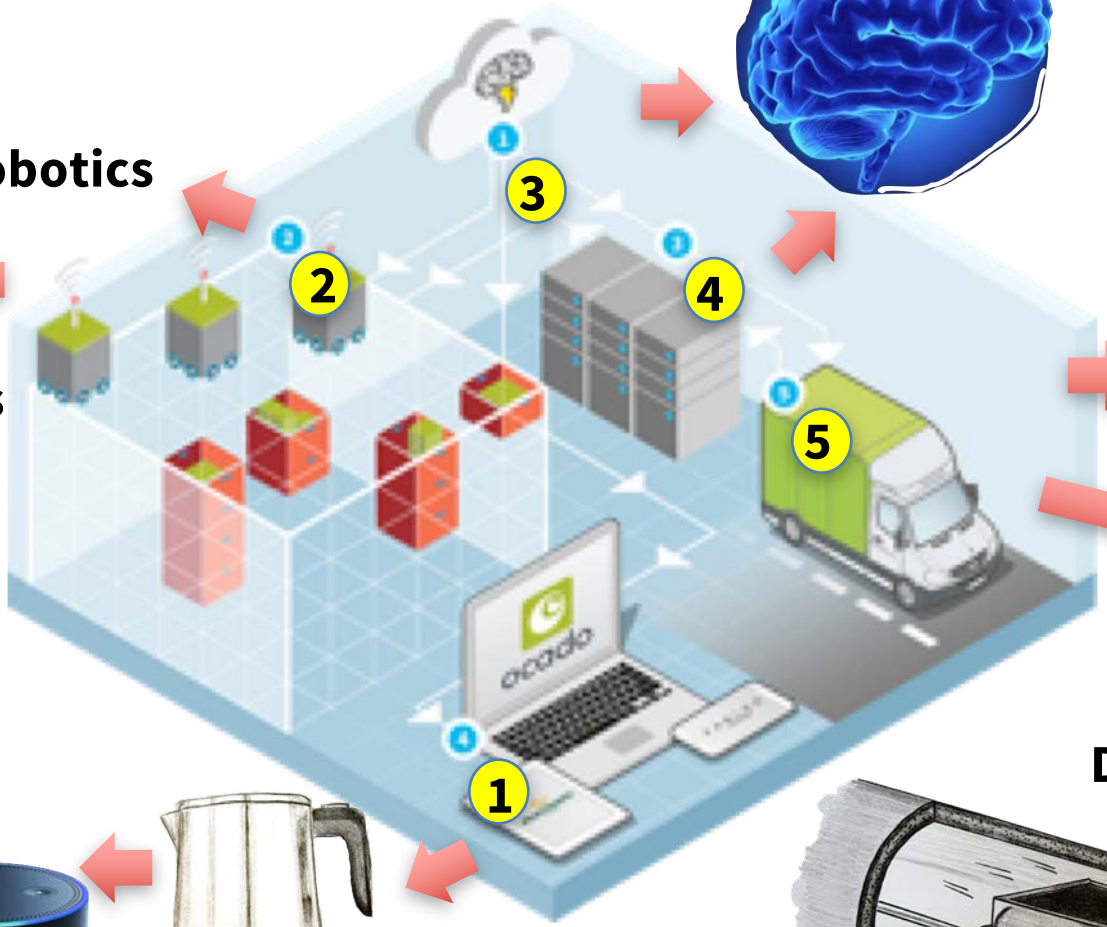
ICT and AI at Ocado

Data analysis
Smart algorithms
AI / machine learning



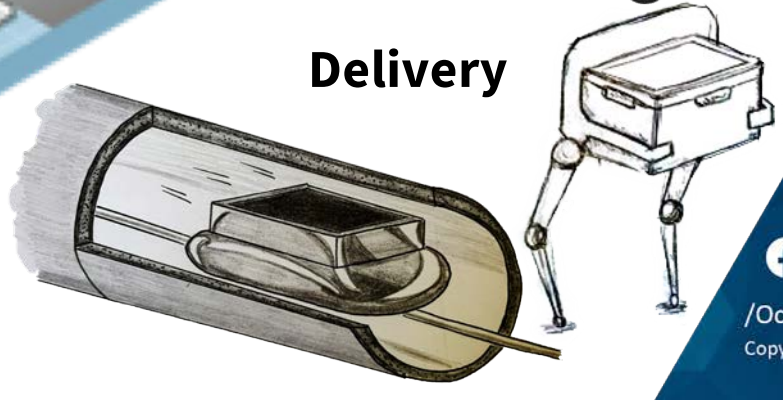
Robotics

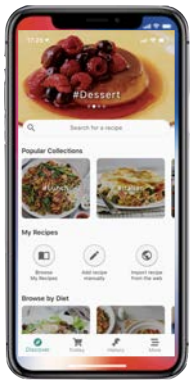
Warehouse Technologies + optimization



Customer service Chat

Delivery





Apps

Interaction / Smart Kitchen

/OcadoTechnology

Copyright © Ocado 2021

ICT and AI in the OSP warehouse…

Bots

- **Travel at 9 miles per hour**
- **Pass 5mm apart**
- **Pick a 50-item order in 5 minutes**

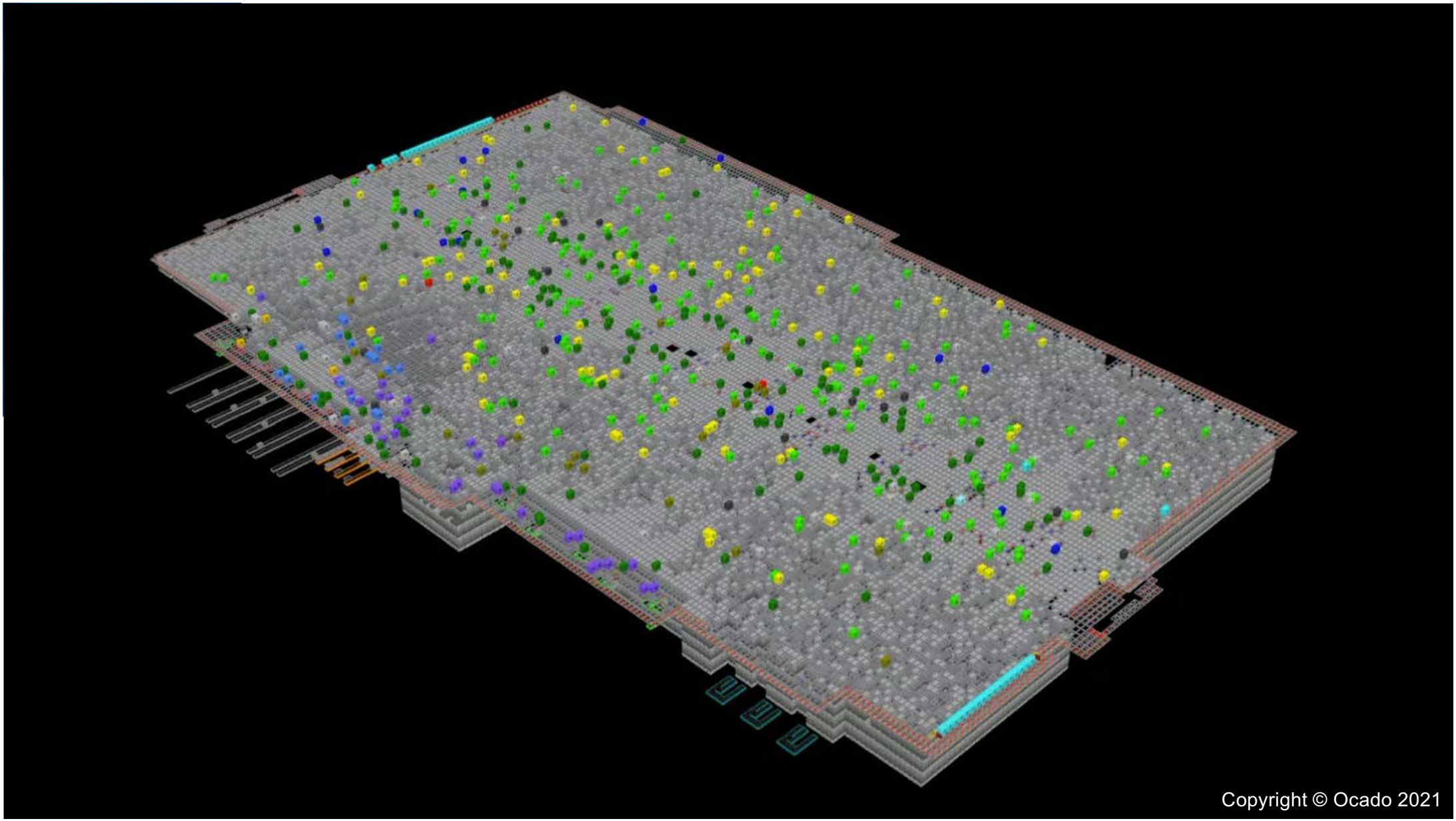
Novel wireless system

- **1,000 bots/base station**
- **3 kbps to each robot**
- **10 messages/second fixed latency**
- **Half a Wi-Fi channel (10 MHz)**
- **Licence-free spectrum (5 GHz)**

4 TB/day diagnostic data feeds machine learning algorithms

/OcadoTechnology

Copyright © Ocado 2021


Copyright © Ocado 2021

Copyright © Ocado 2021

1
2
3
4
© Ocado 2021

Routing optimization at Ocado

- 47,000 orders per day
- 25 drops per van per day
- 2,000 vans; Av. 184 deliveries/van/week
- 1-hour slots
- Van weight limit
- Van volume limit
- 600,000 routing adjustments per second

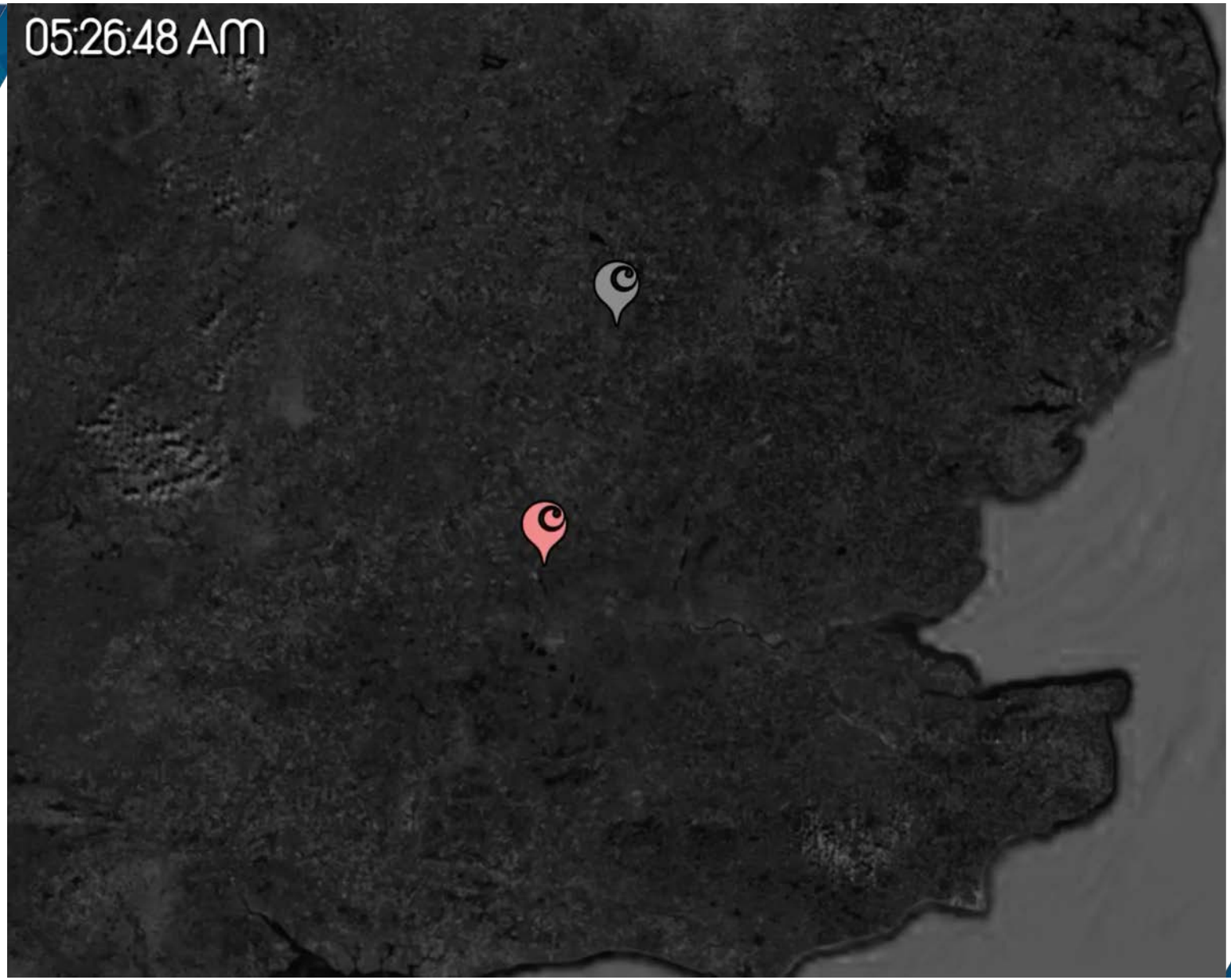
/OcadoTechnology

Copyright © Ocado 2021

ocado
TECHNOLOGY

/OcadoTechnology

Copyright © Ocado 2021



/OcadoTechnology
Copyright © Ocado 2020

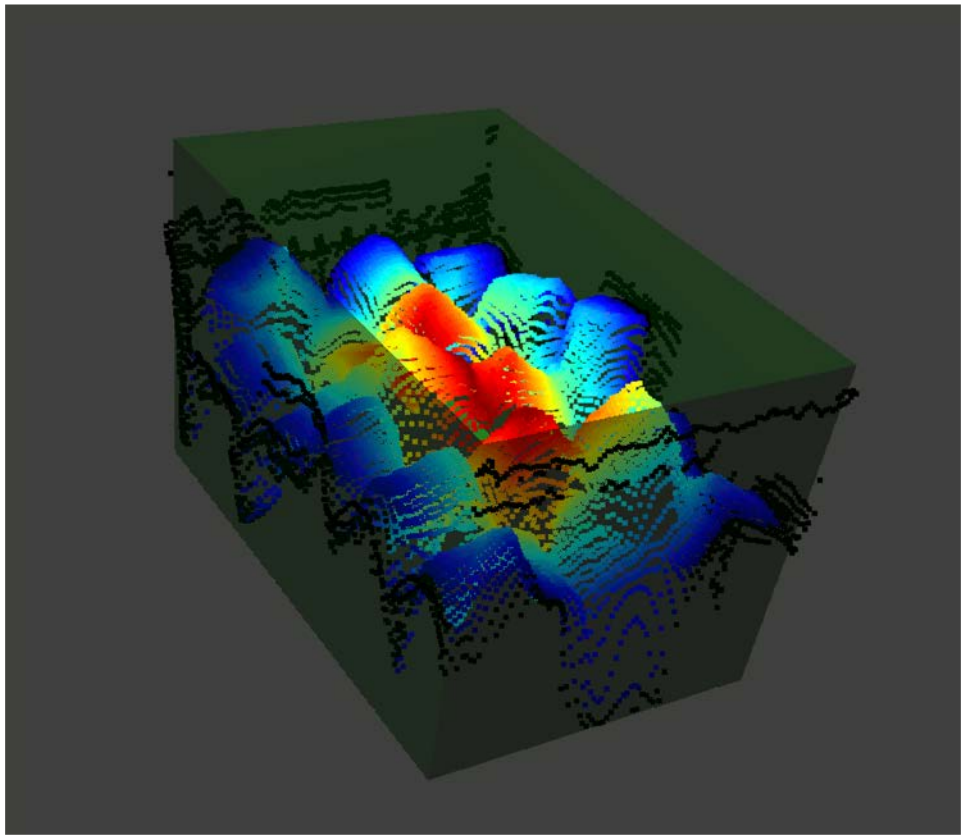
Contents

- Introduction to Ocado
- ICT and AI in the Ocado Smart Platform
- **Picking robotics**
- Delivery robotics

/OcadoTechnology

Copyright © Ocado 2021

ocado
TECHNOLOGY



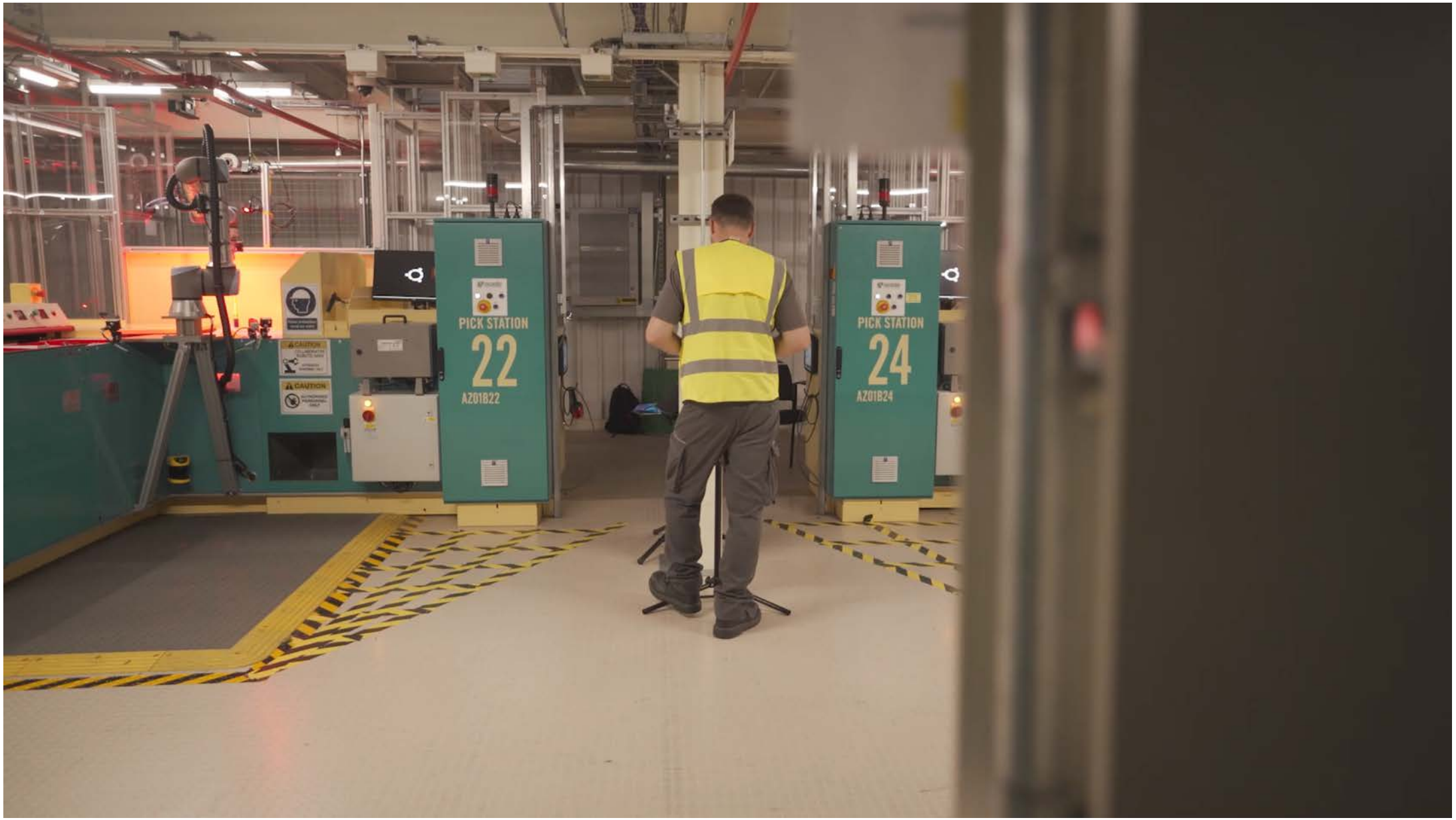
/OcadoTechnology

Copyright © Ocado 2021

Robotic Picking

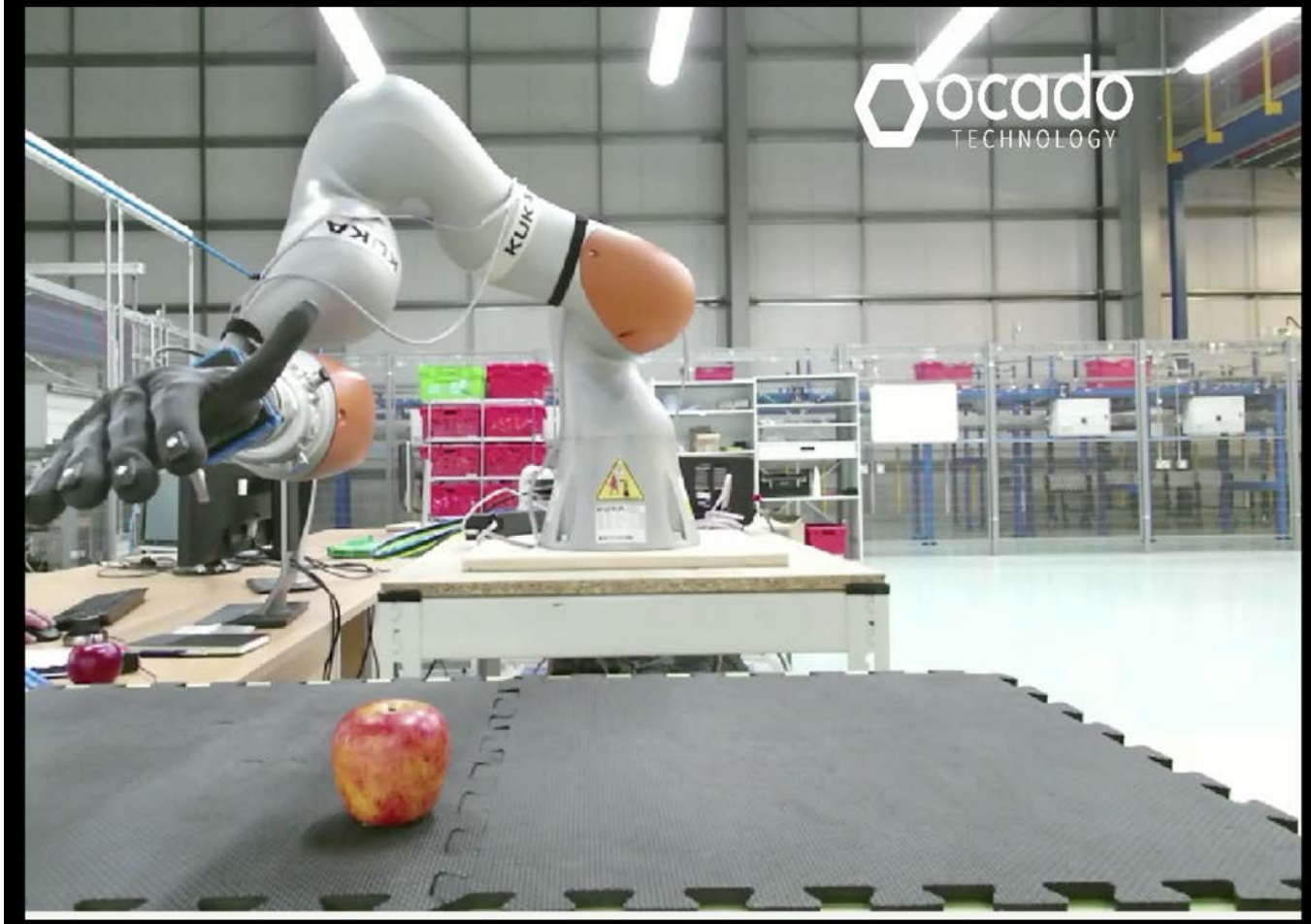
/OcadoTechnology

Copyright © Ocado 2021


PICK STATION
22
AZ01B22
PICK STATION
24
AZ01B24

Robotic picking hands

soma SOFT MANIPULATION



Technische Universität Berlin

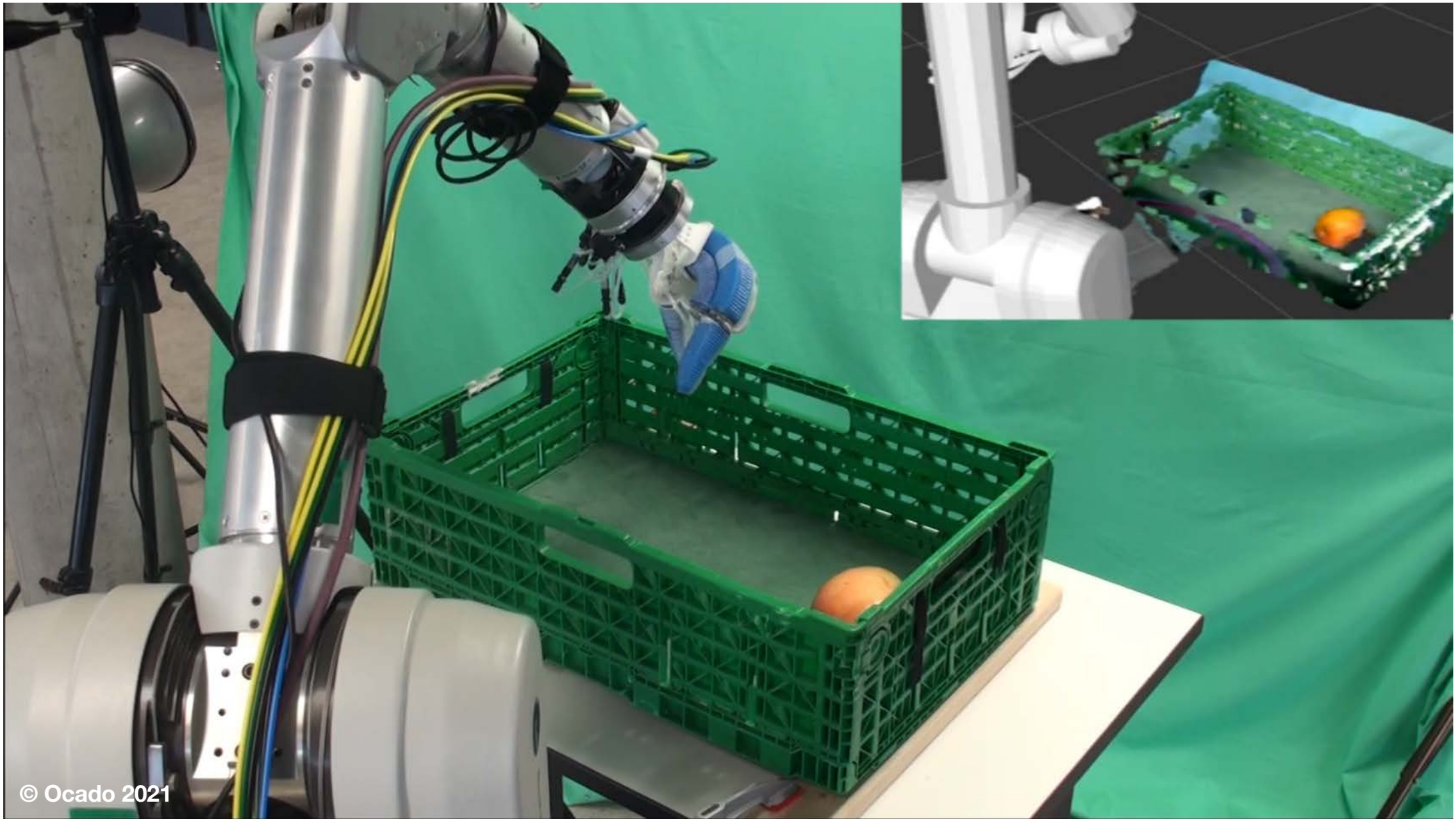
CENTRO E. PIAGGIO
Bioengineering and Robotics Research Center
Università di Pisa

ISTITUTO ITALIANO DI TECNOLOGIA
Istituto Italiano di Tecnologia

DLR
Deutsches Zentrum für Luft- und Raumfahrt
German Aerospace Center
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)

IST AUSTRIA
Institute of Science and Technology
Institute of Science and Technology Austria

Copyright © Ocado 2020

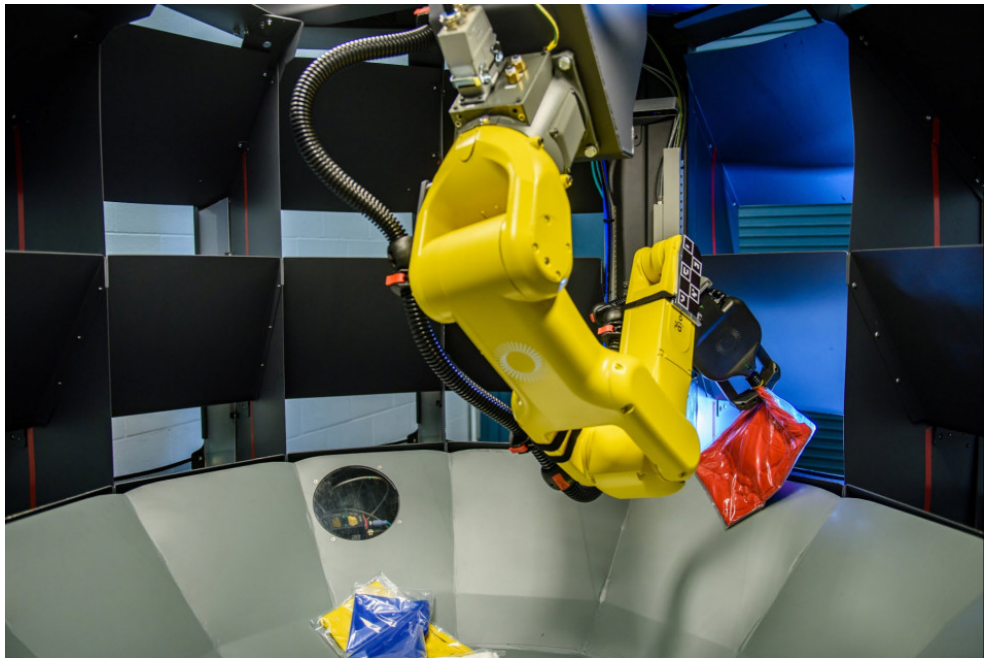

© Ocado 2021

Kindred AI

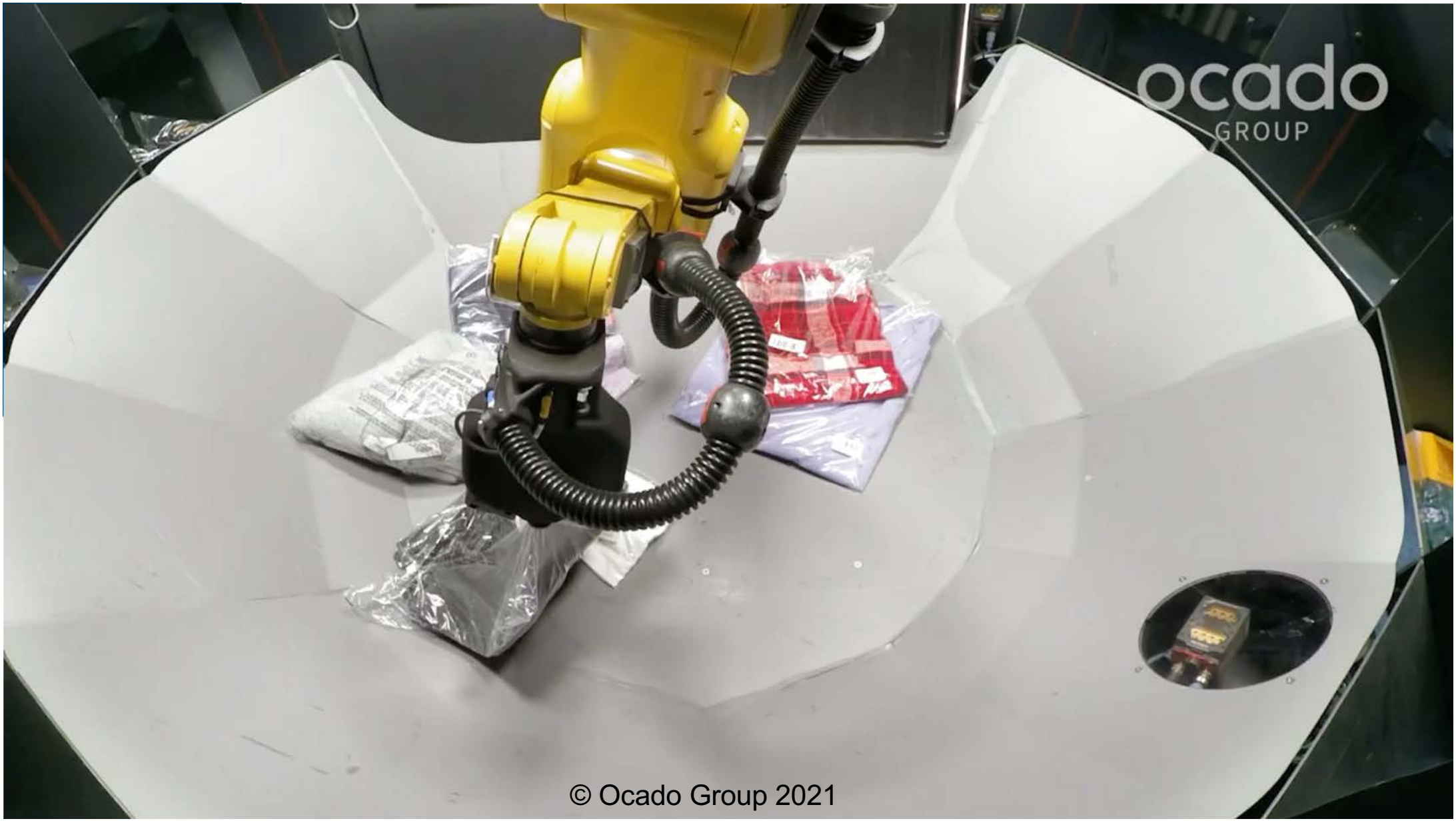
180 installations for picking apparel

AI for picking

Supervised Autonomy for recovery



/OcadoTechnology
Copyright © Ocado 2021



© Ocado Group 2021

Haddington Dynamics

Revolutionary new approach to design and manufacture

- Cycloidal gearbox 3D printed in situ
- Rotational optical encoders have 8,000x more resolution than normal: 1.6 million steps per 360 degrees
- Can measure tiny weight changes at the tip
- 10-micron accuracy with highly sensitive force control

Fundamentally changes the economics of robotics hardware

/OcadoTechnology
Copyright © Ocado 2021

Haddington Dynamics

/OcadoTechnology

Copyright © Ocado 2021

© Ocado 2020

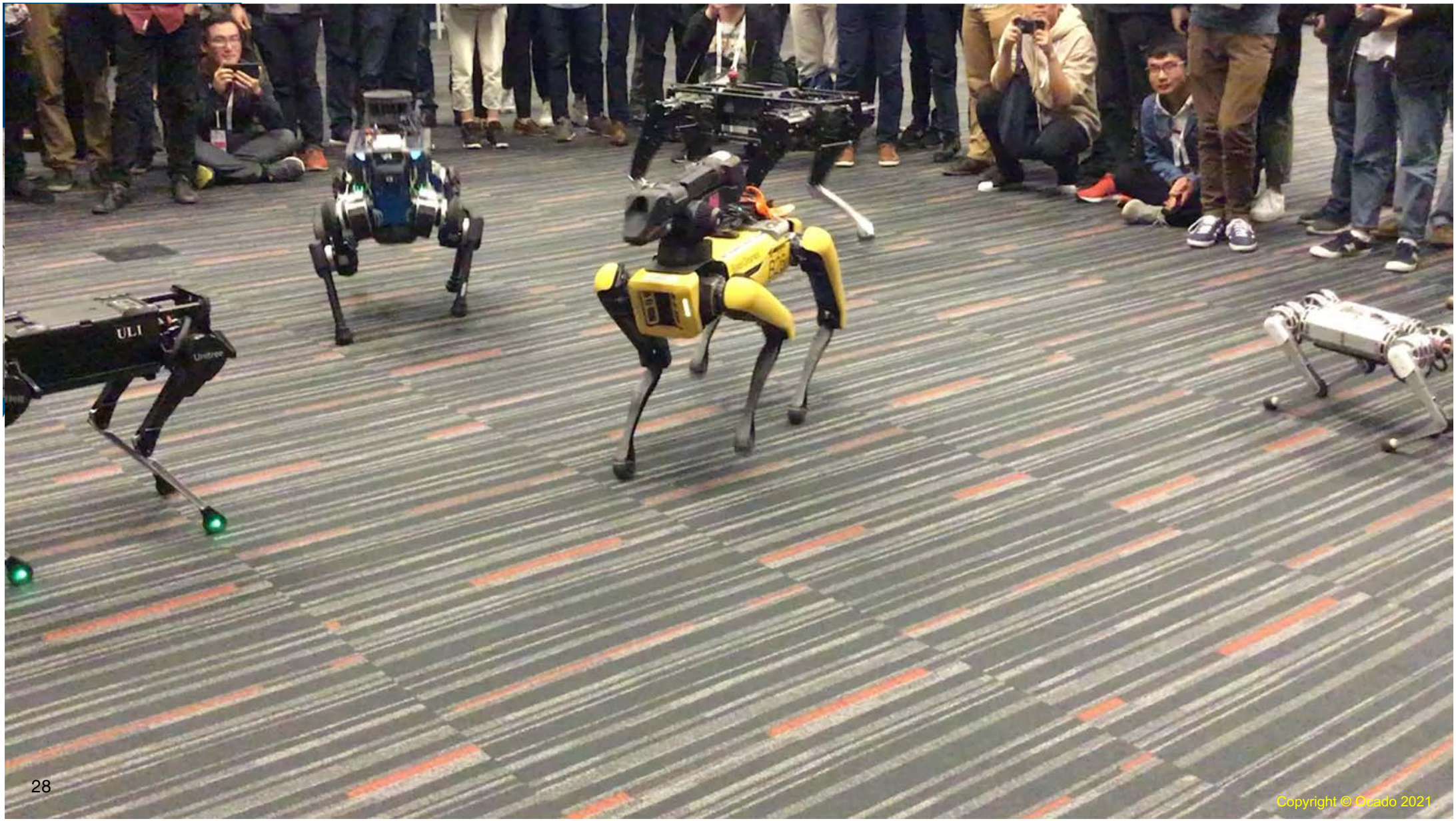
Contents

- Introduction to Ocado
- ICT and AI in the Ocado Smart Platform
- Picking robotics
- **Delivery robotics**

/OcadoTechnology

Copyright © Ocado 2021

OXBOTICA



Copyright © Ocado 2021

Transformation of international grocery ecommerce through the Ocado Smart Platform

Dr David Sharp
Head of Ocado Technology 10x

david.sharp@ocado.com
07880 052 064

/OcadoTechnology

Copyright © Ocado 2021

ICT and AI Summit
18/03/2021
10:00 – 11:30
Hertfordshire Chamber of Commerce
Webinars

THE Businesses COMMUNITY ST.ALBANS