www.pickit3d.com

AI Implication in Manufacturing

구성용

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최근 나온 **로봇** 기술 보셨나요 ?

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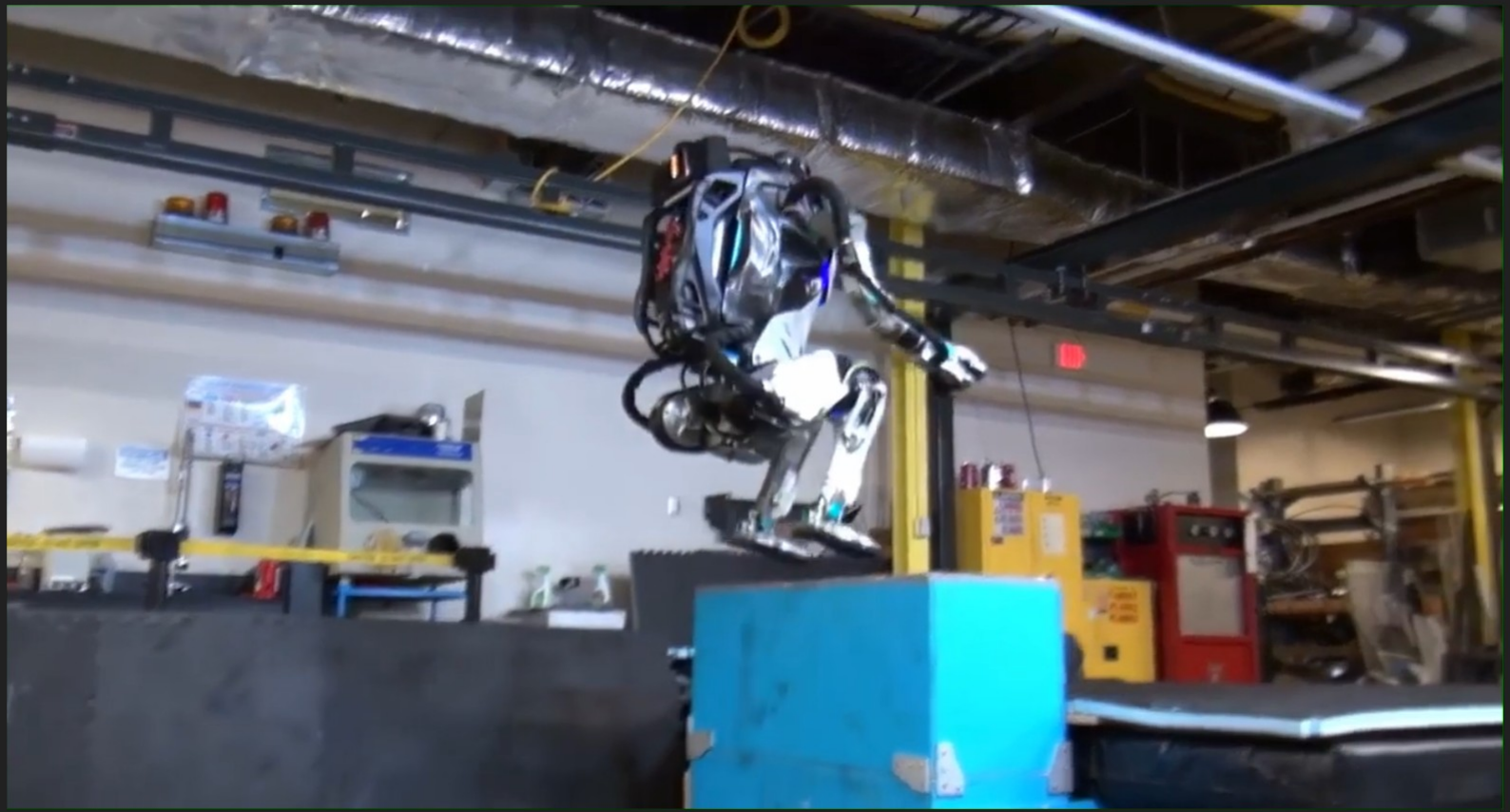

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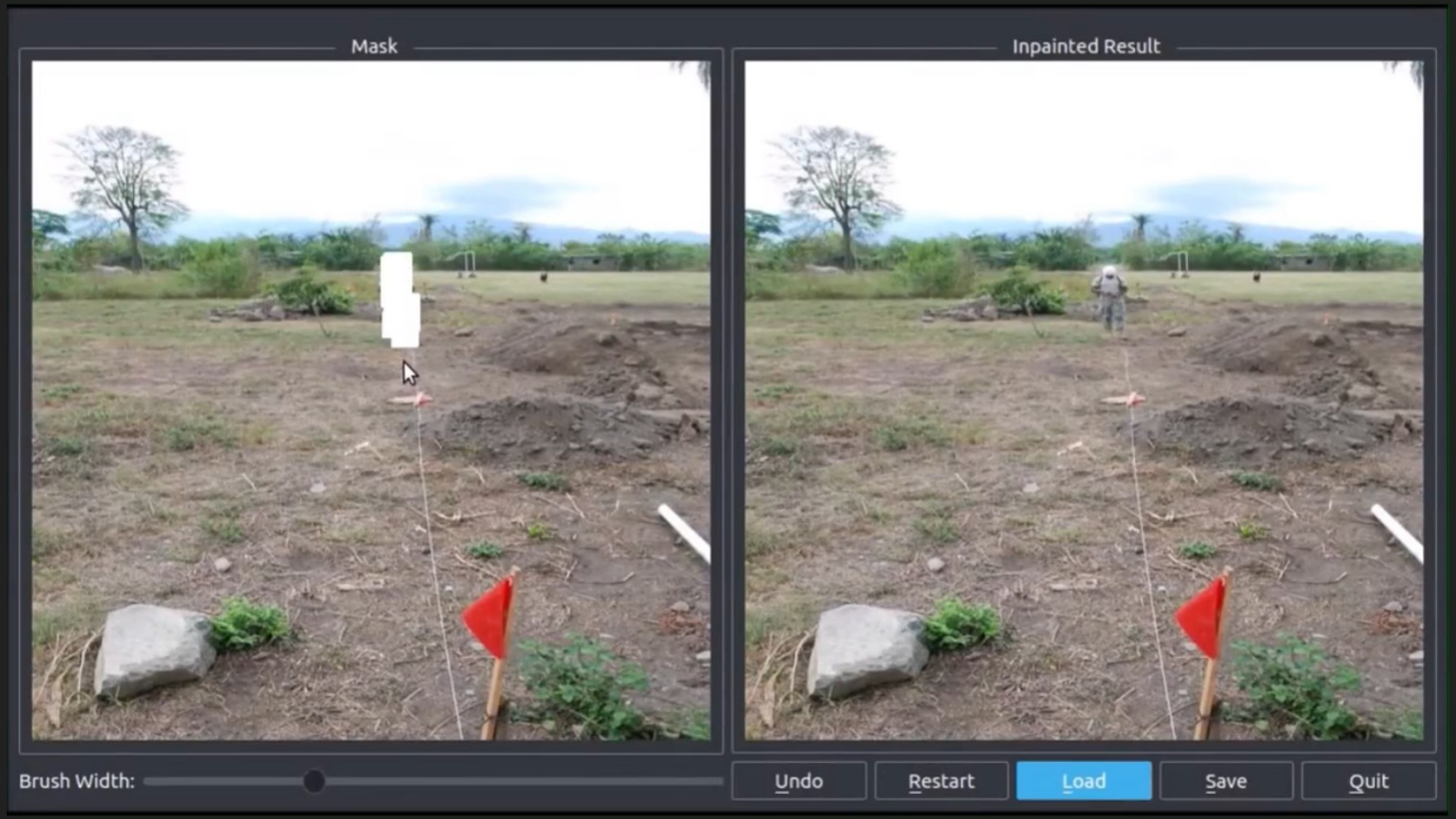
최근 나온 **인공지능** 기술 보셨나요 ?



인공지능 / 로봇 기술 발달

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1950 — 2000 — 2014 — 20XX

기초 연구

Neural Networks
Machine Learning
Computer Vision
Control theory
Robotics
...

기술 개발

Big data
Deep learning
GPUs
3D camera
Motion planning
...

산업 성장

ICT
Manufacturing
Service
Industry
Entertainment
...

제조 산업 (Manufacturing Industry)

원재료를 인력이나 기계력 및 여러 다른 힘으로 **가공**하여 제품을 **대량 생산**하는 산업

제조 산업 (Manufacturing Industry)

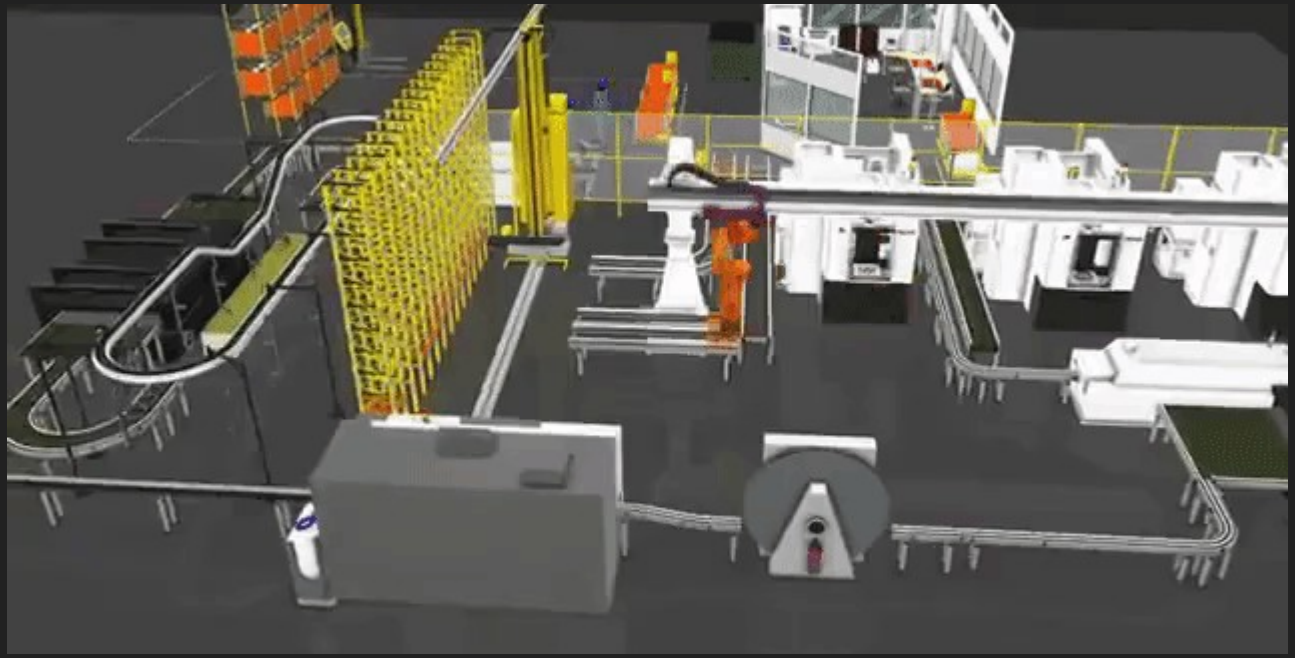
대량 생산

비싼 시설

긴 생산 라인

오래된 역사

Conservative!



오늘의 주제

새로운 기술  Conservative 산업의 변화

1. 산업 시장의 변화

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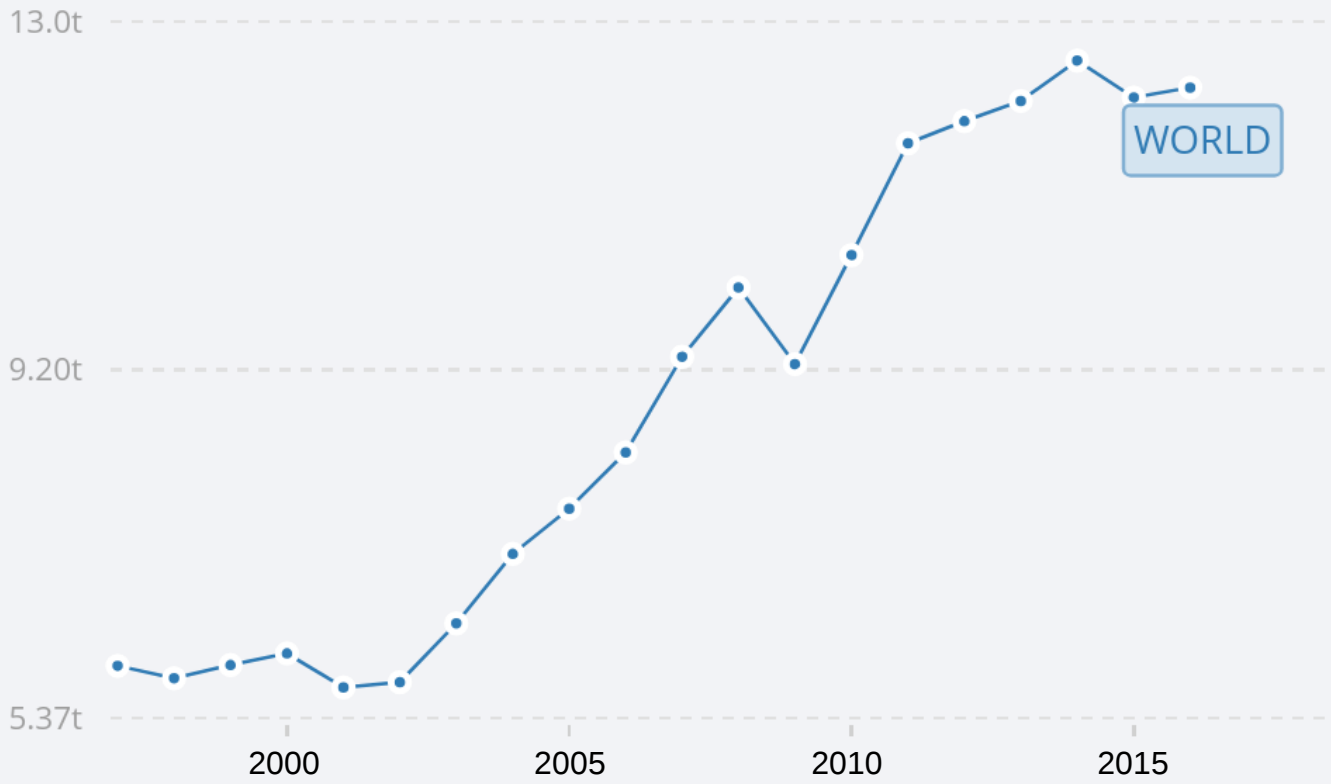
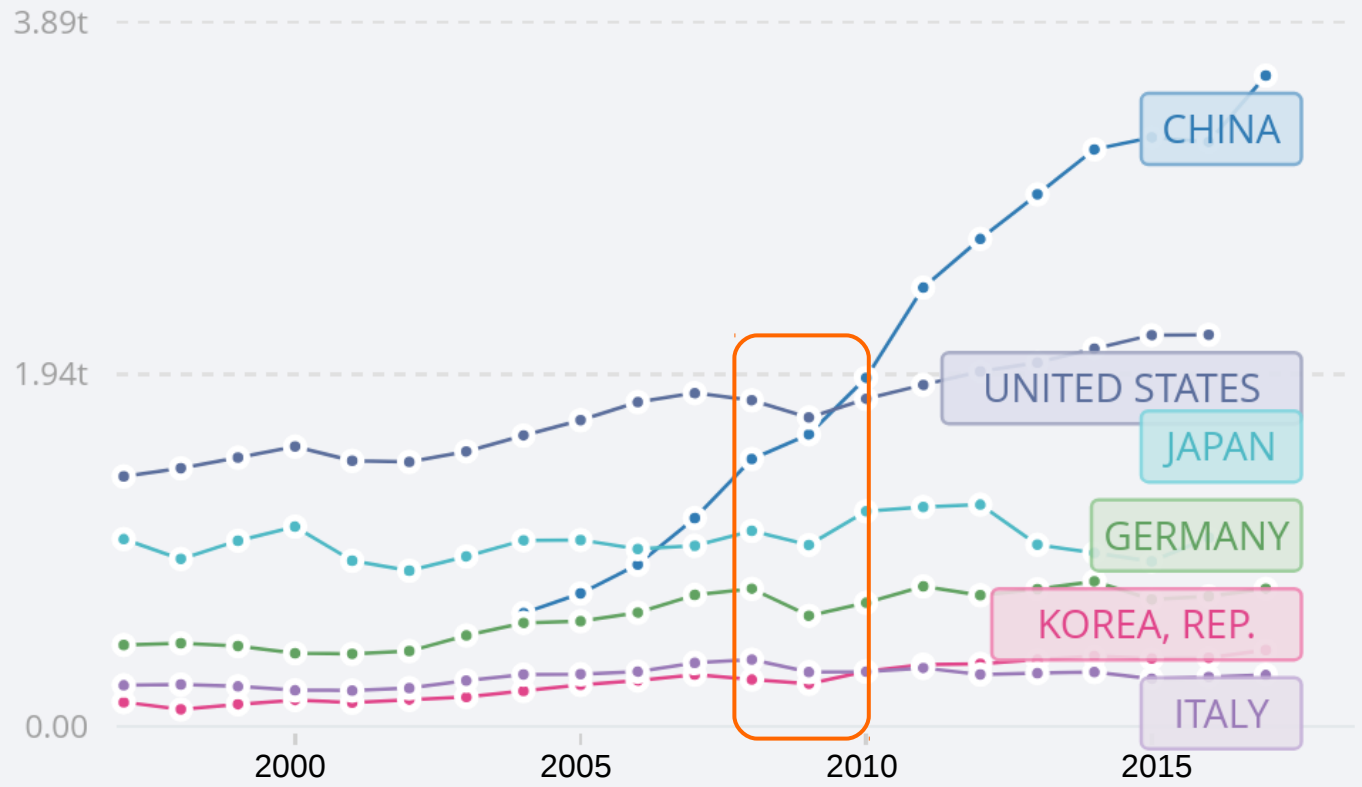
Manufacturing, value added (current US$)



Data from World Bank

Manufacturing, value added (current US$)



Data from World Bank

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노동 시장의 변화

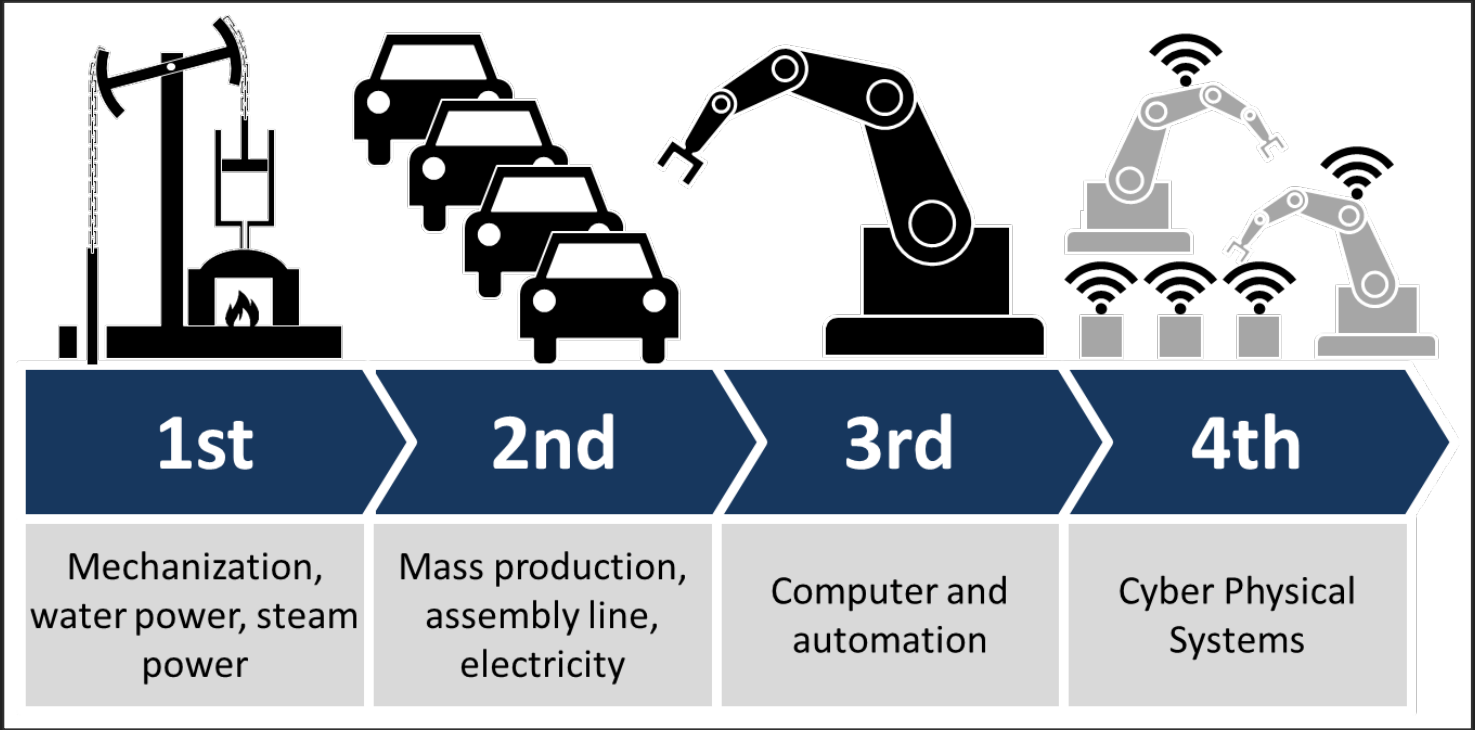
노동 인구 감소 , 인건비 상승

소비자 성향 변화

소품종 대량 생산 → 다품종 소량 생산

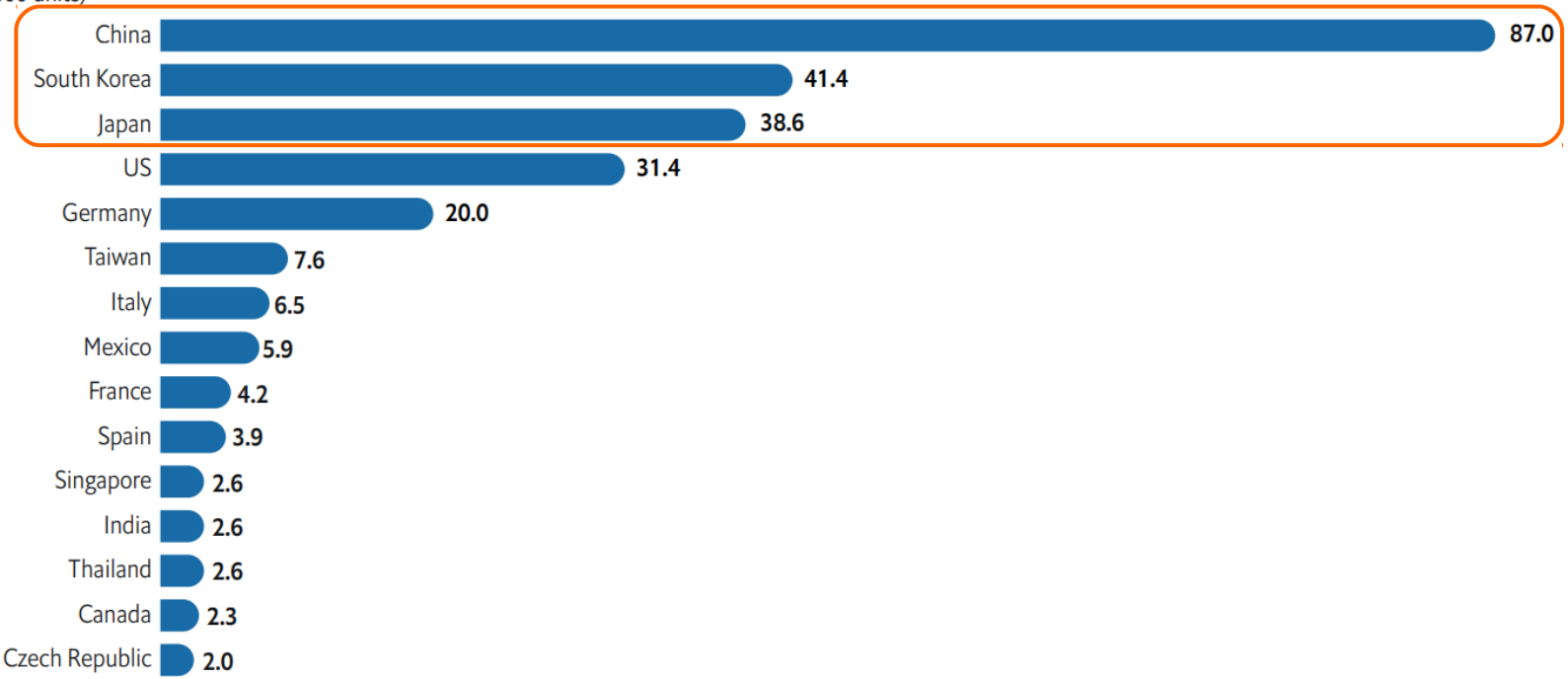
효율적이고 유연한 생산 시스템 도입 필요

Industry 4.0


1st
2nd
3rd
4th
Mechanization, water power, steam power
Mass production, assembly line, electricity
Computer and automation
Cyber Physical Systems

Estimated worldwide annual supply of industrial robots, 10 largest markets, 2016

('000 units)



Source: International Federation of Robotics, *World Robotics 2017 Industrial Robots.*

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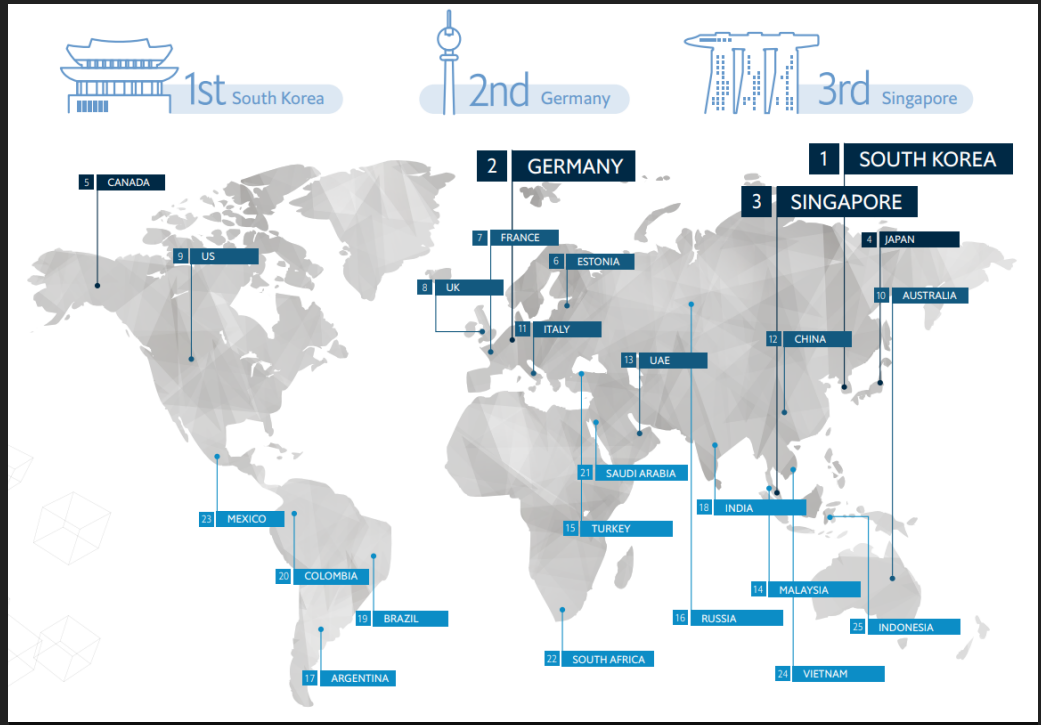
Automation Readiness Index 2018

How well-prepared 25 countries are for the challenges and opportunities of **intelligent automation**.

혁신 환경 평가
Innovation for automation

교육 정책 평가
Skills for an automated economy

노동 시장 정책 평가
Managing workplace transitions



Created by The Economist Intelligence Unit and sponsored by ABB, 2018

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2. 그랜드 챌린지

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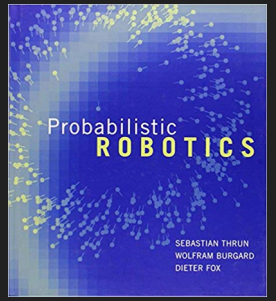
2004 – 2007 DARPA Grand Challenge

Sebastian Thrun 교수 , Probabilistic Robotics 저자



2005 년 Stanford Racing Team 우승

2007 년 Sebastian Thrun 교수 구글에 합류

2012 년 구글 자율주행차 최초 시내 주행 성공

2017 년 Waymo 등 자율주행 자동차 스타트업

WAYMO

ImageNet Large Scale Visual Recognition Challenge

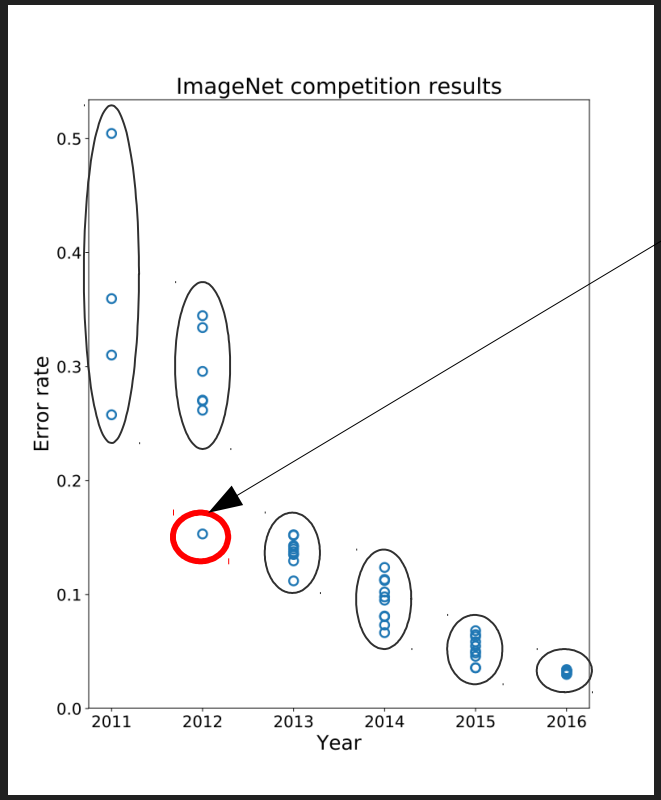
Fei Fei Li 교수

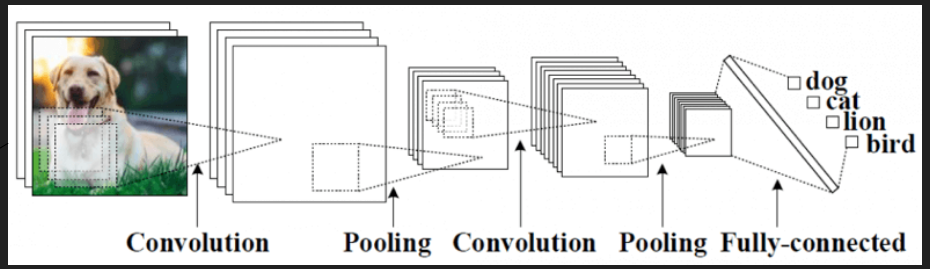
2010 년 부터 14M 이상 이미지 빅데이터 제공

컴퓨터 비전 기술 챌린지 (이미지 인식 , 물체 검출 , 물체 인식 ...)

IMAGENET

ImageNet Large Scale Visual Recognition Challenge





Convolutional Neural Networks

NVIDIA CUDA

Caffe2 · CNTK · TensorFlow · theano · Chainer · PYTORCH · dmlc mxnet · K

100 STARTUPS USING ARTIFICIAL INTELLIGENCE TO TRANSFORM INDUSTRIES

CONVERSATIONAL AI/ BOTS

MindMeld, semanticmachines, Maluuba, Mobvoi 出门问问, KITT.AI, snips, clara, AUTOMAT, X.

VISION

clarifai, Chronocam, Orbital Insight, pilot.ai, captricity, GROKSTYLE

AUTO

nuTonomy, drive.ai, AIMOTIVE, nauto, nexar, ZOOX

ROBOTICS

UBTECH Dream With Robot, anki, Rokid, dispatch

CYBERSECURITY

CYLANCE, sift science, sparkcognition, deepinstinct, Shift Technology, DARKTRACE

BUSINESS INTELLIGENCE & ANALYTICS

DataRobot, TRIFACTA, rapidminer, tamr, SIGOPT, Paxata, context relevant, Dataminr, CrowdFlower, logz.io

CORE AI

affectiva, PETUUM, ALGORITHMIA, H2O.ai, loop ai Labs COGNITIVE COMPUTING, CognitiveScale, sentient, Voyager Labs, Numenta, SCALED INFERENCE, skymind, vicarious, Digital Reasoning, bonsai, AYASDI

AD, SALES, CRM

TalkIQ, deep gram, [PERSADO], Appier, CHORUS, INSIDE SALES .COM, drawbridge, DigitalGenius Human+AI Customer Service, RESCI

HEALTHCARE

freenome, CLOUD MEDX, zebra, enlitic, twoXAR, iCarbonX 碳云智能, Atomwise Better medicines faster., deep genomics, babylon, BenevolentAI, Lunit

THE INNOVATION SUMMIT
CBINSIGHTS

TEXT ANALYSIS/ GENERATION

textio, fido.ai, cortical.io, NarrativeScience Tell the Stories Hidden in Your Data

IOT/IIOT

nanit, KONUX, VERDIGRIS, SIGHT MACHINE Manufacturing Analytics

COMMERCE

bloomreach, mode.ai

FINTECH & INSURANCE

CAPE ANALYTICS, KENSHO, NUMERAI, alphasense, Kasisto

OTHER

GIGSTER, prospera, Citrine, BLUERIVER TECHNOLOGY, ROSS, zymergen, Descartes Labs, gradescope, talla

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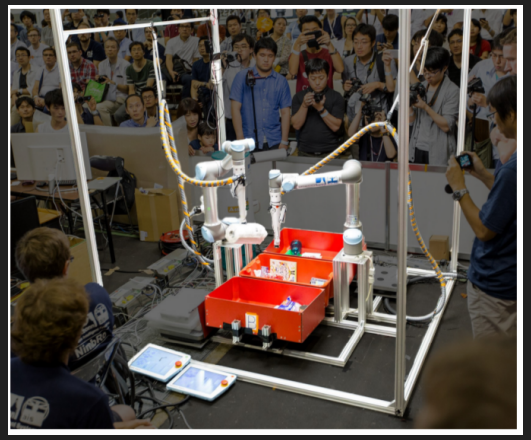
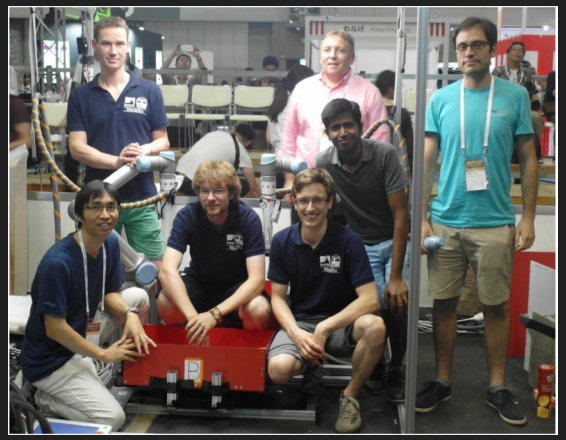
Amazon Warehouse

Amazon Robotics Challenge (2015 - 2017)

Stow task: Stowing of newly arrived items into a storage system

Pick task: Retrieval and packing of specific items from storage into boxes





University of Bonn, Germany (Team NimbRo), 2nd place in 2016 and 2017

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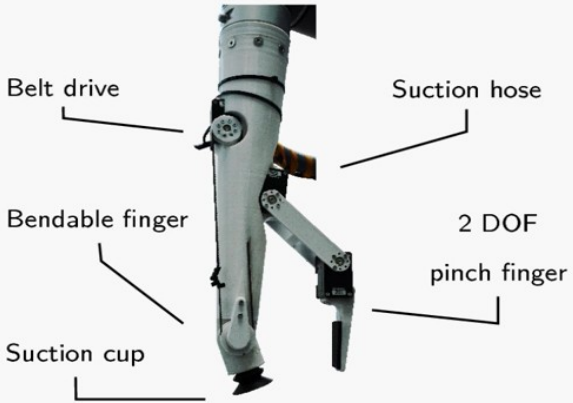
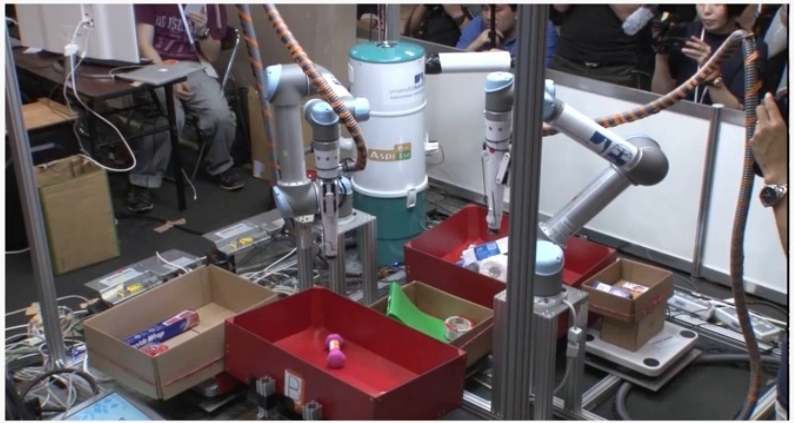
System Design

Endeffector Design





This endeffector design allows us to grasp items using suction...

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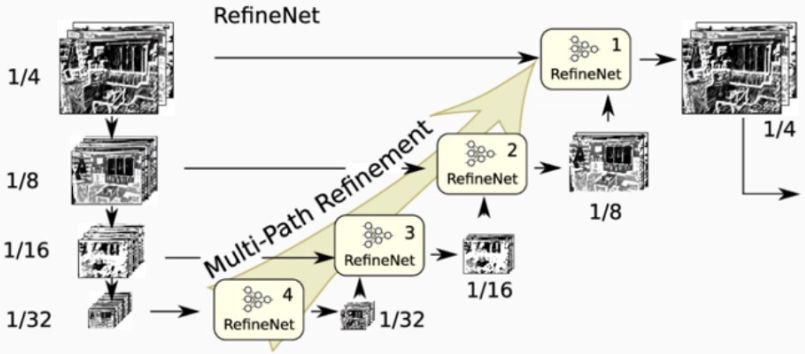
Sensor Setup

Semantic Segmentation

A state-of-the-art semantic segmentation method is used to perceive objects.



RefineNet: Multi-Path Refinement Networks for High-Resolution Semantic Segmentation

Guosheng Lin, Anton Milan, Chunhua Shen, Ian Reid

CVPR 2017

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Data Capture, Scene Synthesis & Training

We capture new objects using a turntable and generate synthetic scenes on top of annotated dataset frames. Training is performed in ≈ 30 min on four Titan X cards.

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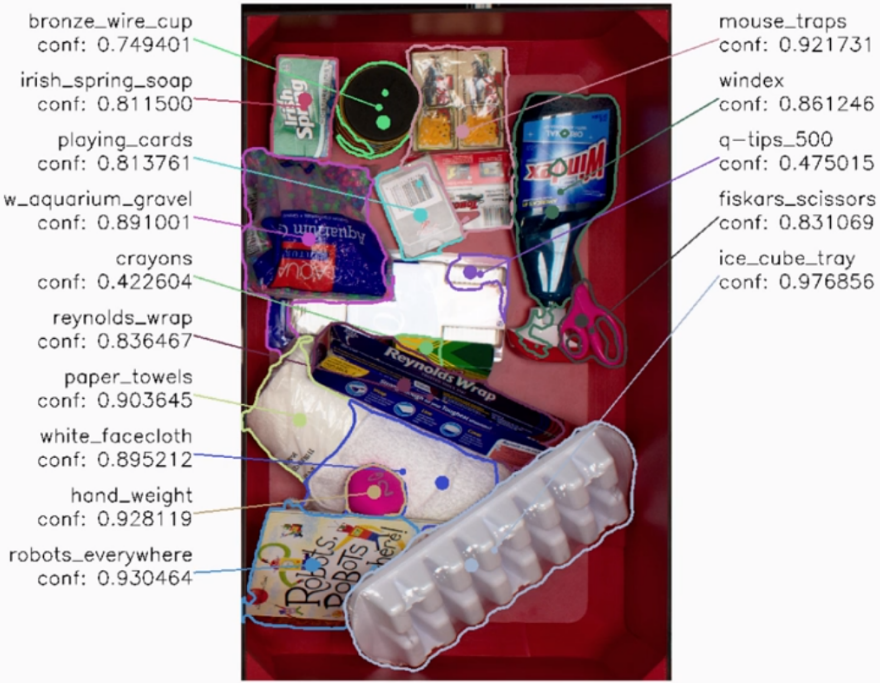
Grasp Generation



- Object contours are extracted from segmentation.
- 2D grasp points with maximum distance to the contour are found.
- 6D grasp poses are calculated from depth and local surface normals.

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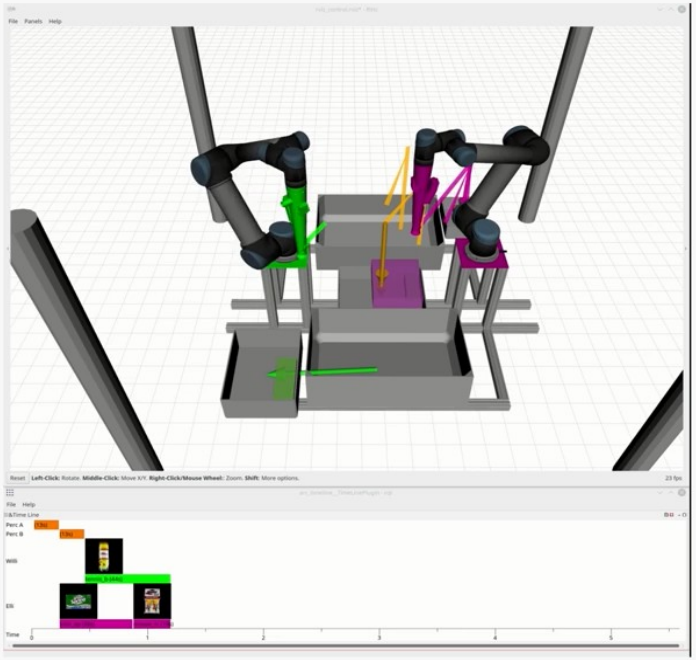
Dual-Arm Coordination



Collision free task assignment:

Green & purple: Arm activities.
Yellow: unassigned task generated from latest perception result.

Timeline of system activities.

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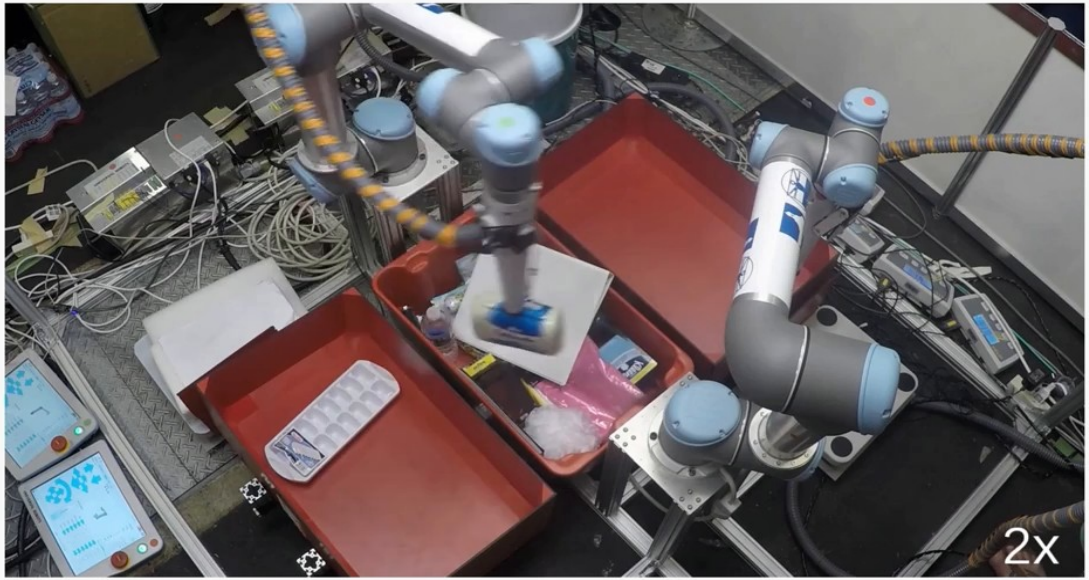
Stow Task



Move all items from the tote into the storage system.

3. 핀테크 (Pin-tech) 스타트업

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아마존 로보틱스 챌린지의 영향을 받은 스타트업

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amazon robotics

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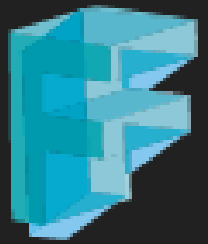
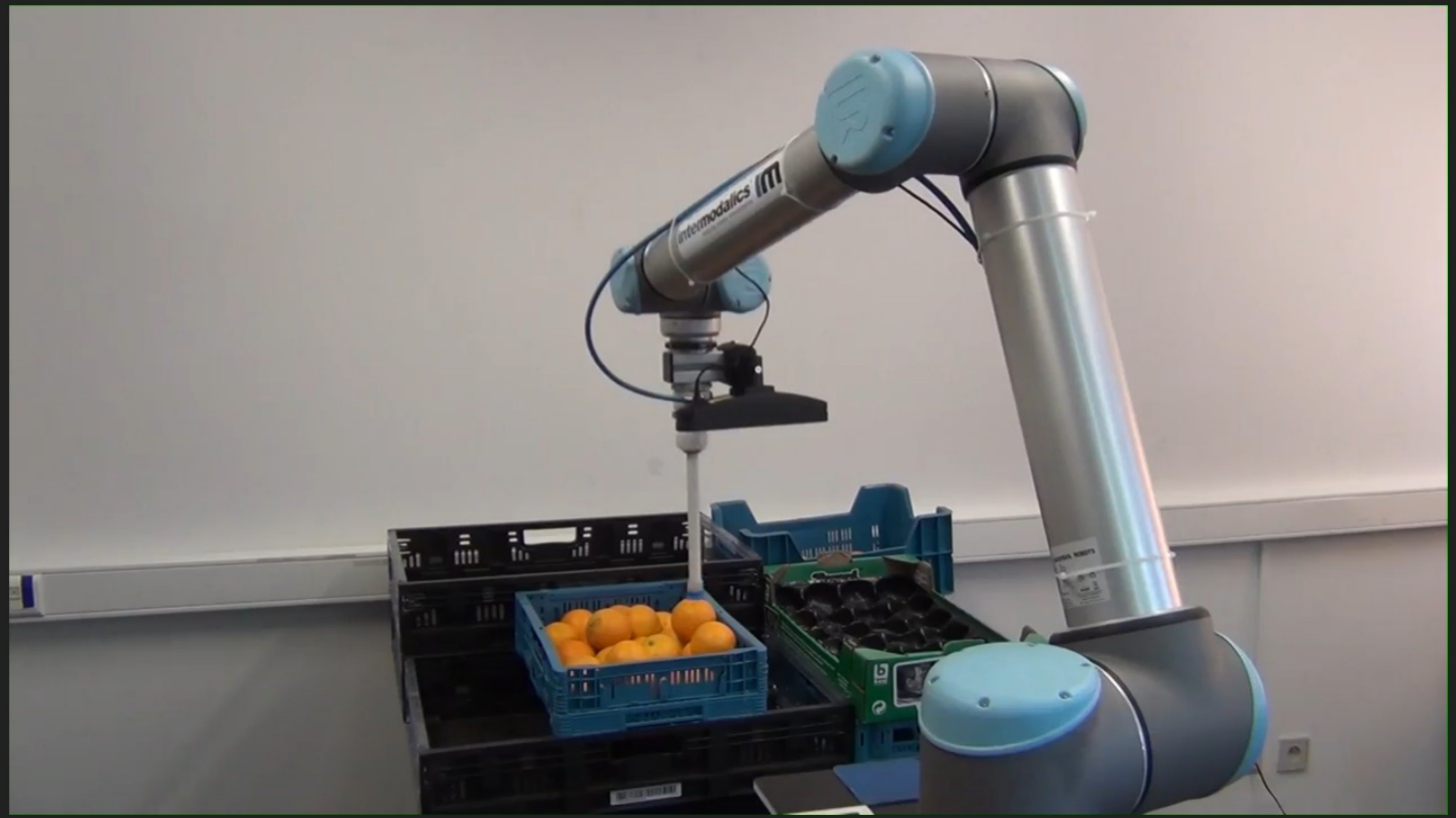
Photoneo
focused on 3D

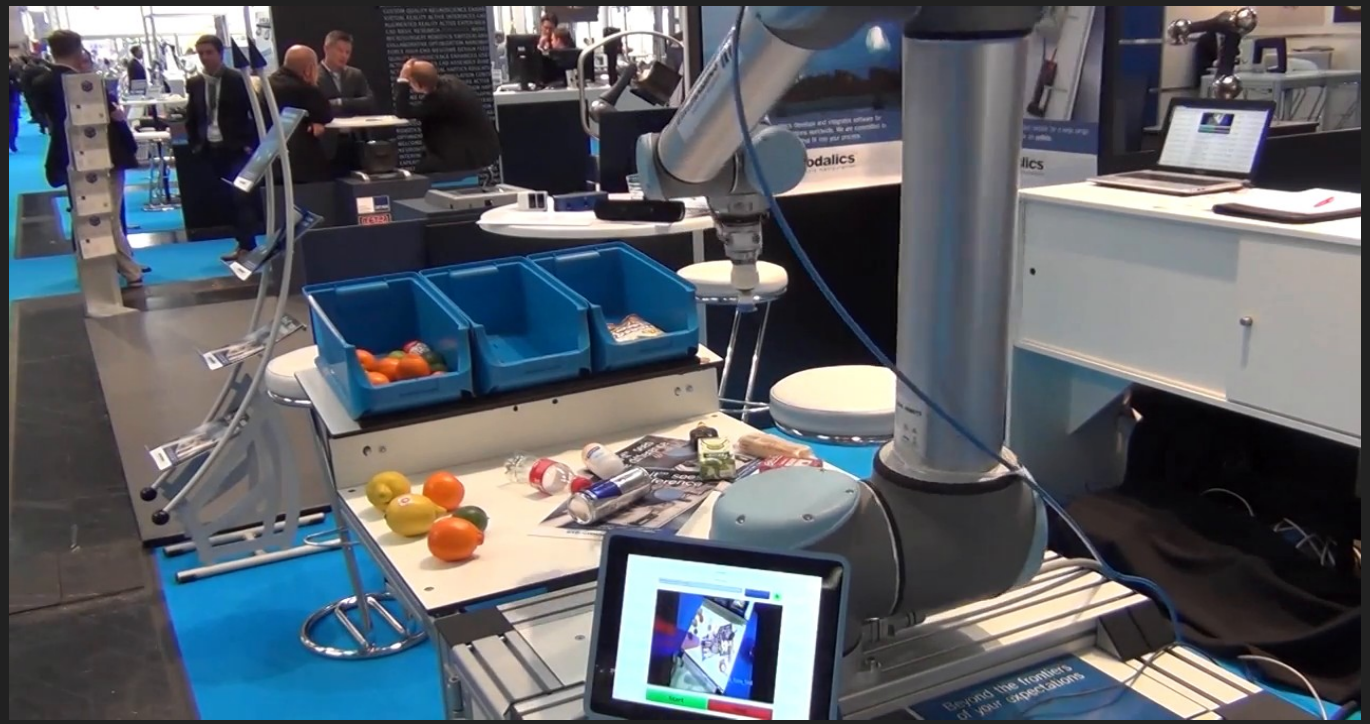


FIZYR

Pick-it 2014



Pick-it 2014 Automatica



Pick-it 2014 ~ 2016

Robot manipulator

2D / 3D camera

Software

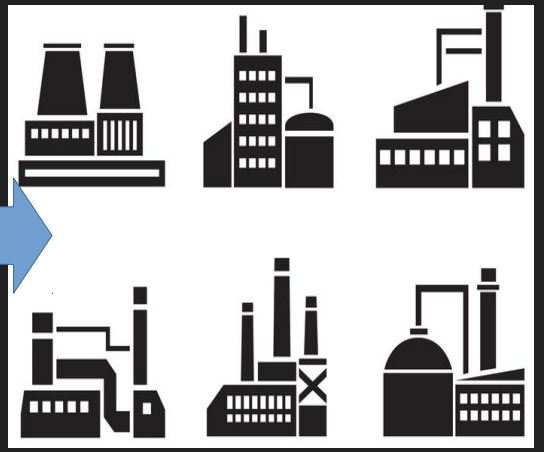
Component Providers

Allied Automation

NEFF
www.neffautomation.com

ESPS

System Integrators



Customers

Pick-it 2014 ~ 2016

3D 비전 설치에
시간과 비용이 많이 들어요 .

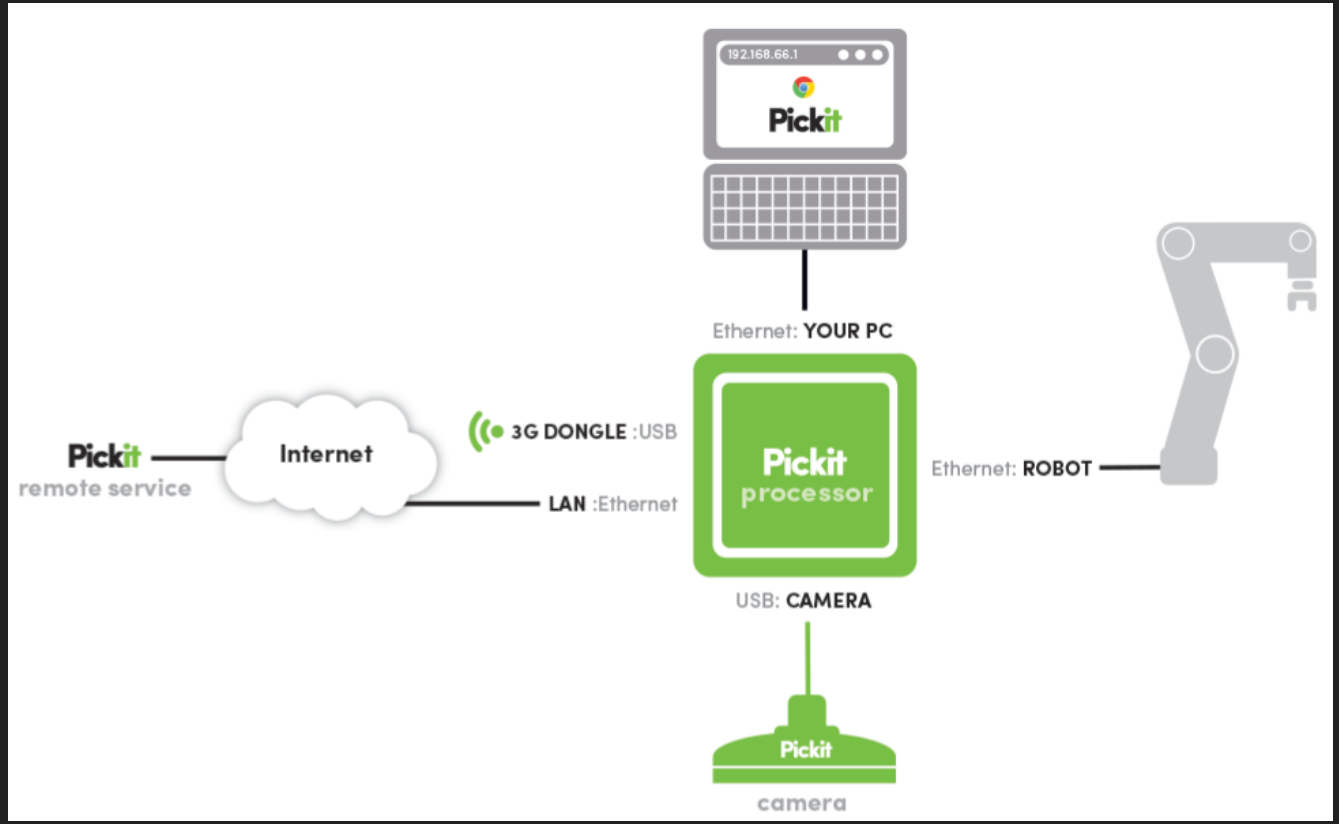
Plug-and-Play

Easy-of-Use

First Pick on the First Day

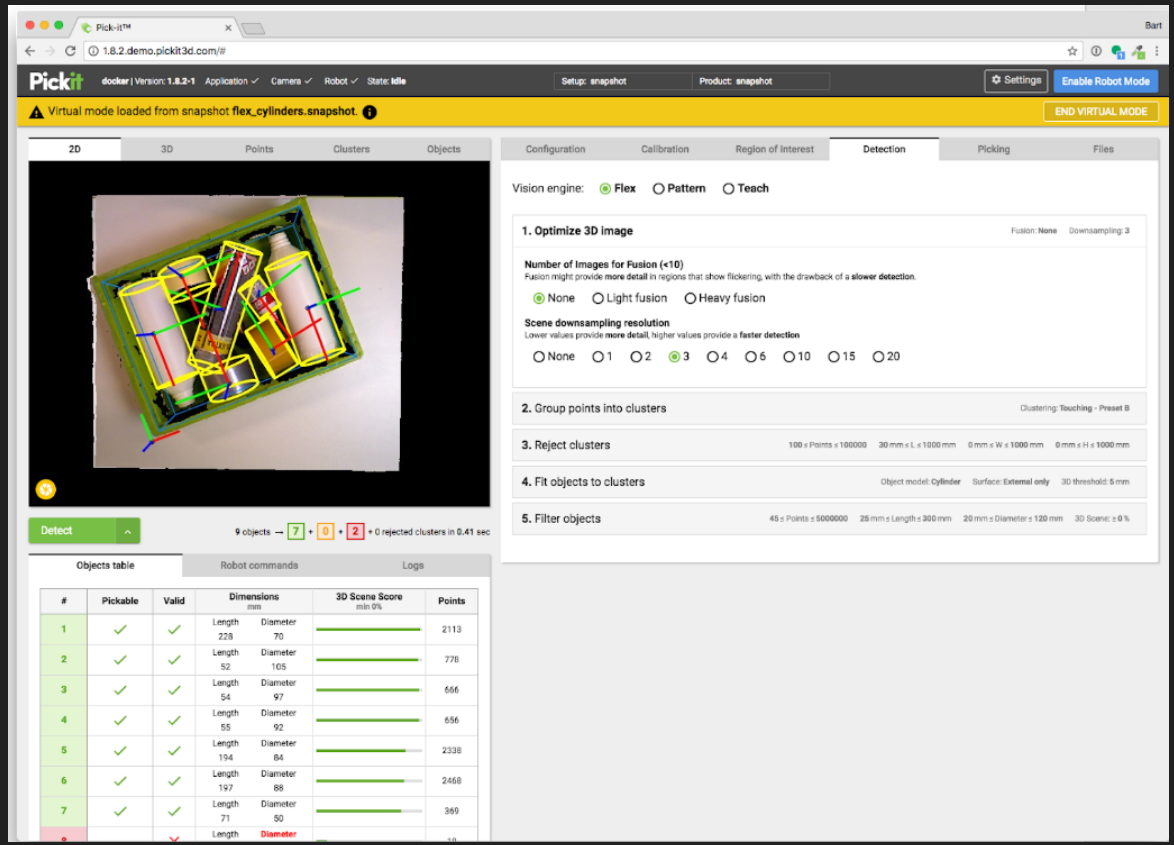
Pick-it 2014 ~ 2016

서포트가
힘들어요 .



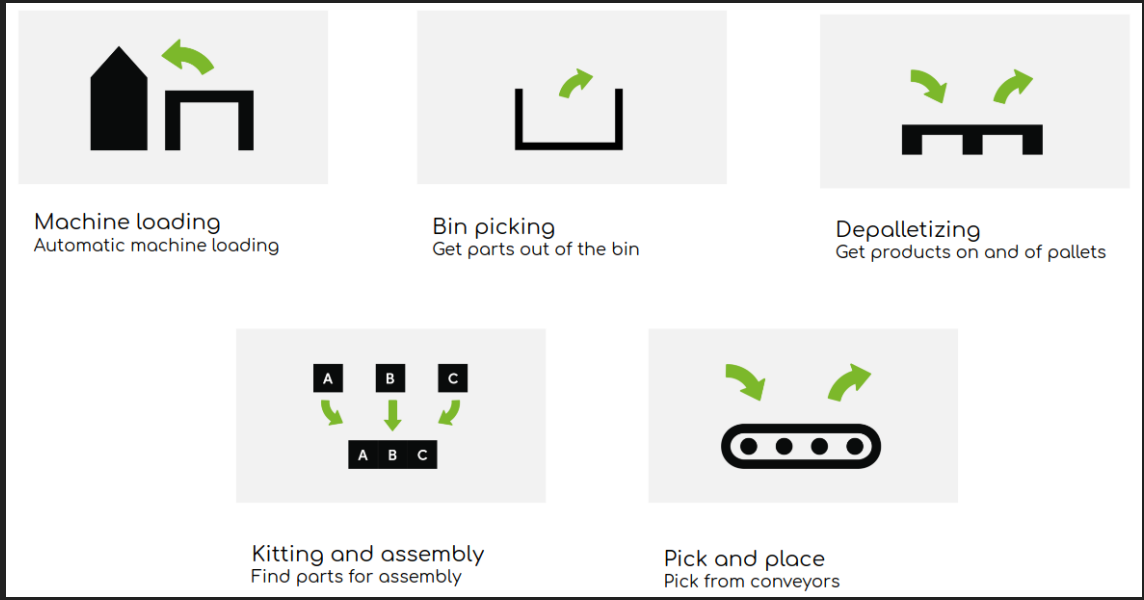
Pick-it 2014 ~ 2016

프로그래밍이
어려워요 .



Pick-it 2014 ~ 2016

프로그래밍이
어려워요 .



UNIVERSAL ROBOTS FANUC ABB

YASKAWA KUKA STÄUBLI

Pick-it 2016

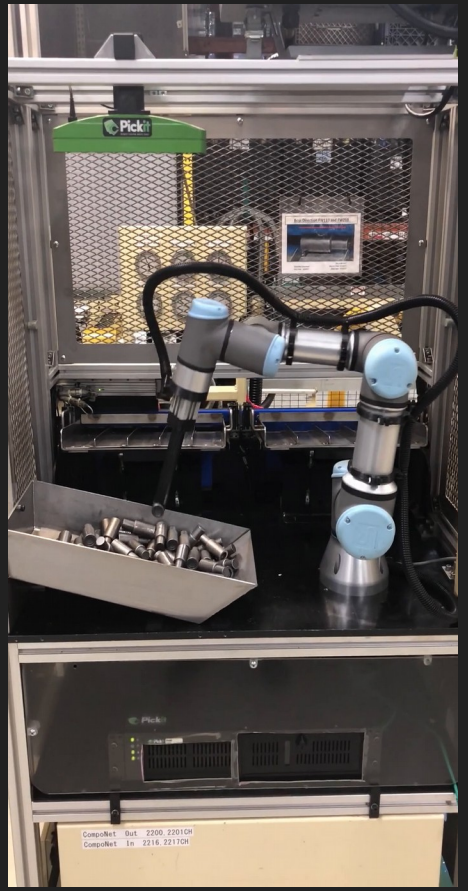
Pick-it 2017

Pick-it in Action

*"The Pick-it product works great and has an **expected ROI of 2 years**, including the four Universal Robots.*

*"Getting started with **Pick-it was very easy**. Each system was installed and seeing parts in less than an hour."*

*"After setting up four robot cells with Pick-it, we now have sufficient experience to **install and integrate it with a UR in less than an hour.**"*



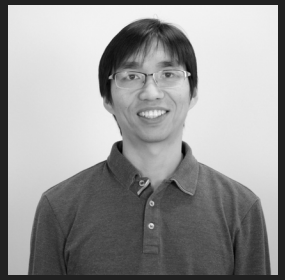
Pick-it in Action

*"I quickly adopted it and learned to **program it by myself**."*

*"Any question I had could be resolved within one or two days by the responsive Pick-it support team. Especially **the use of snapshots** made the communication with the support team very efficient.*

*"I already bought **four** PIck-it systems: **two of them are running in production**"*

Pick-it 2017 - 2018



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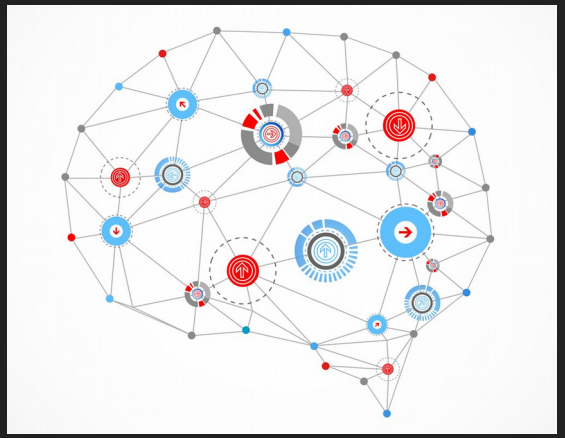
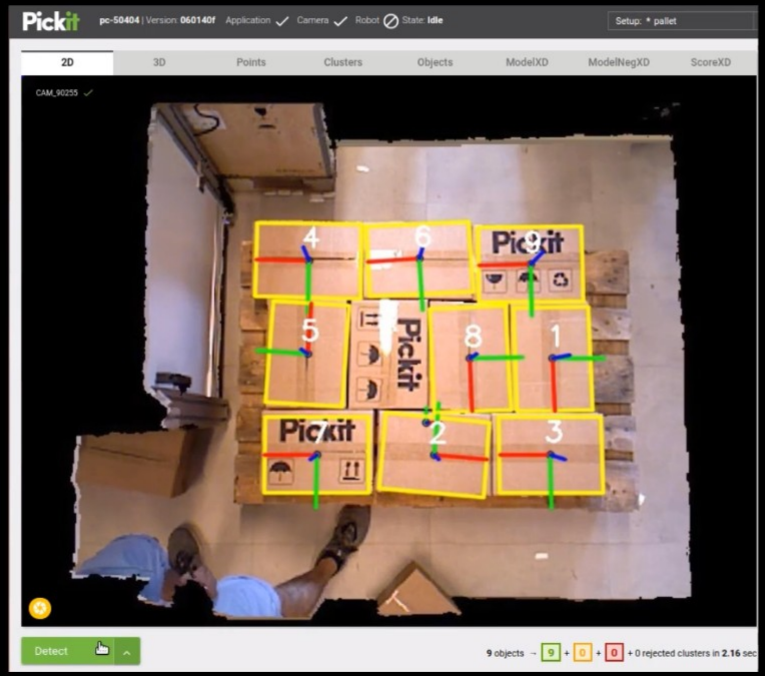
+



시간은 ?

가격은 ?

Pick-it 2018



1x speed

Pick-it with ABB

Pick-it at Automatica 2018

Pick-it at Automatica 2018

미래는 ?

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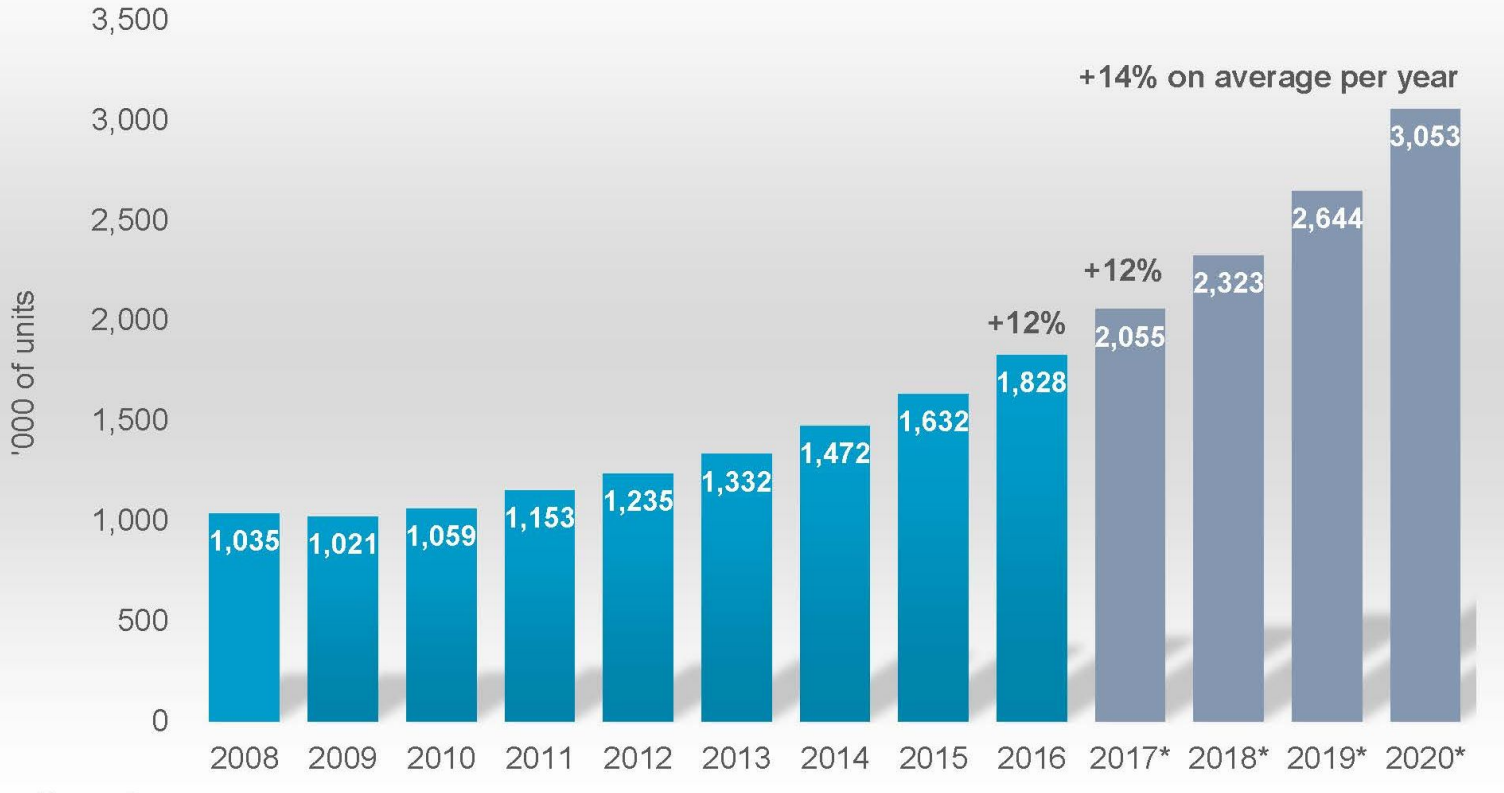
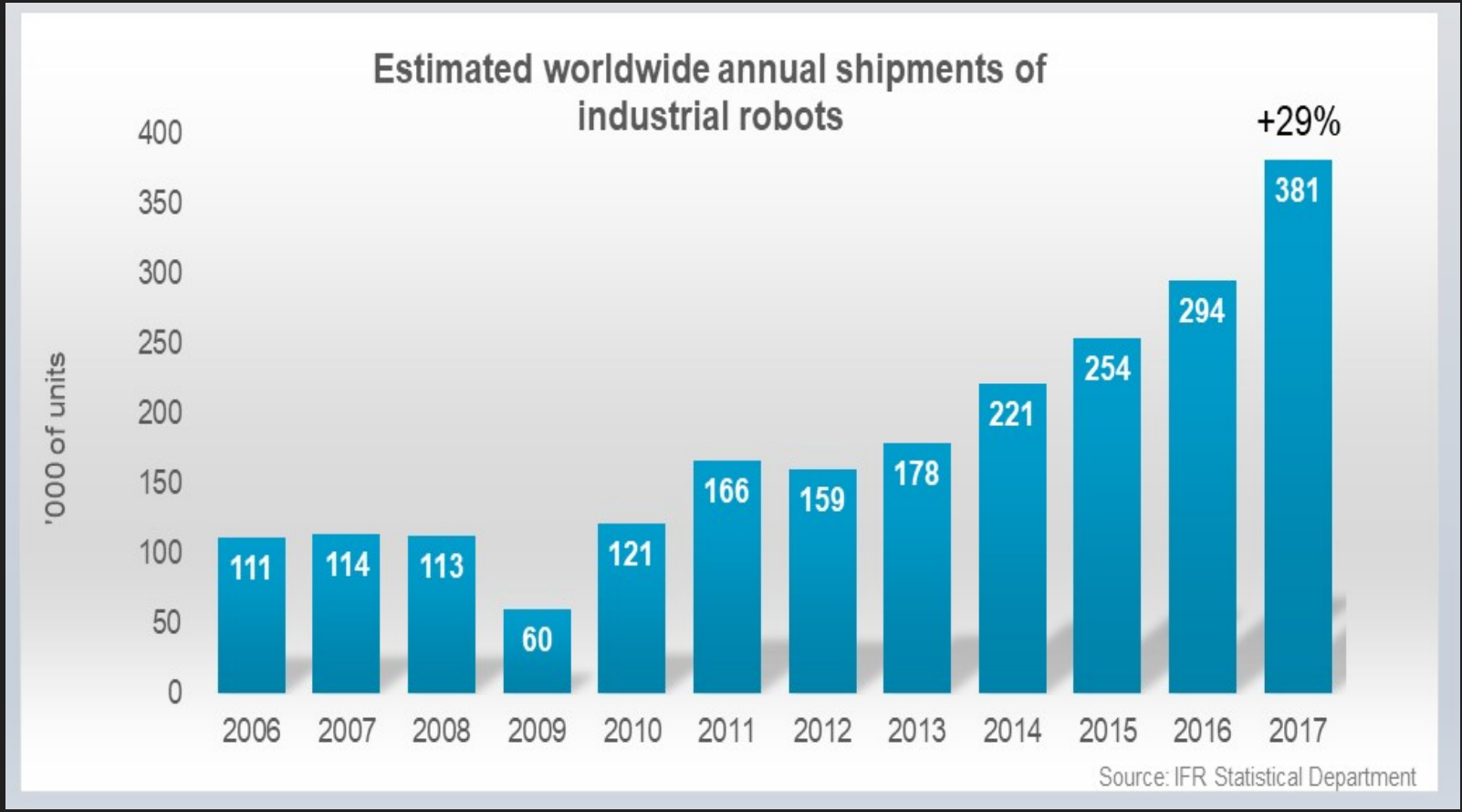
Estimated worldwide operational stock of industrial robots 2015-2016 and forecast for 2017*-2020*



*forecast

IFR World Robotocs 2017



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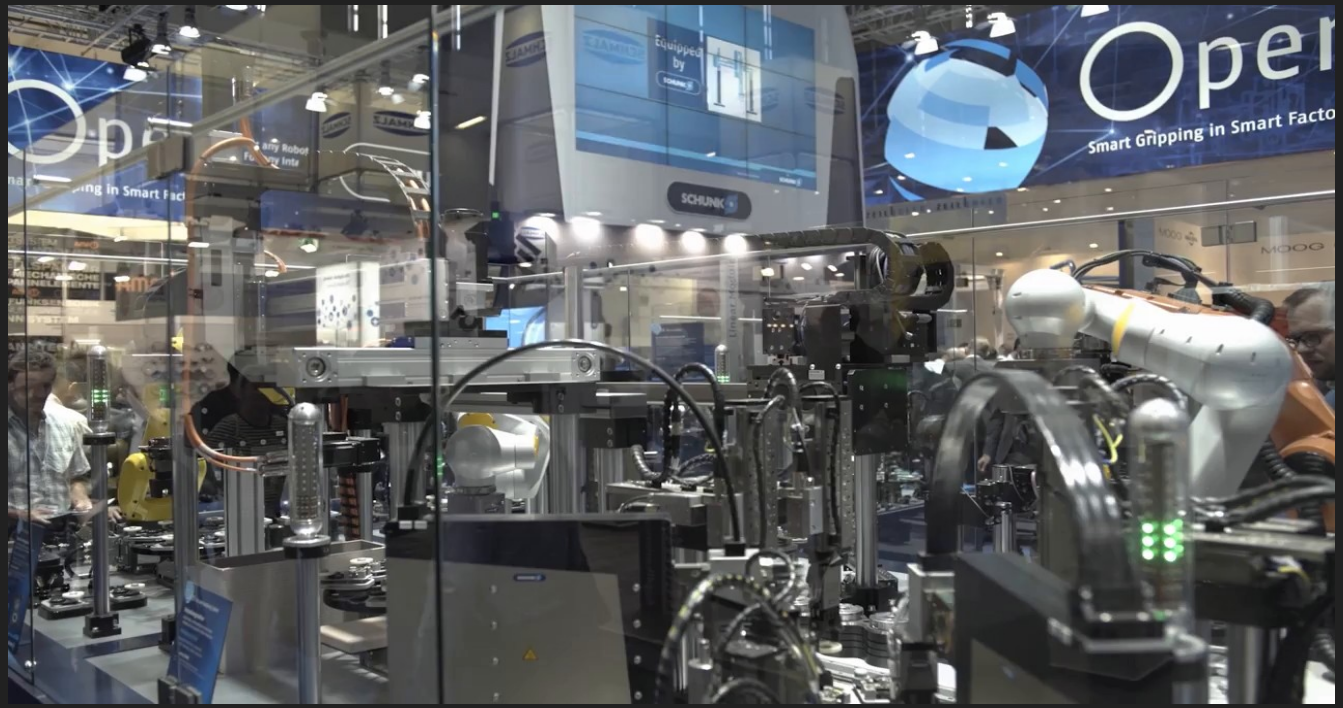
*“Key trends such as **digitalisation, simplification and human-robot collaboration** will certainly shape the future and drive forward rapid development.”*

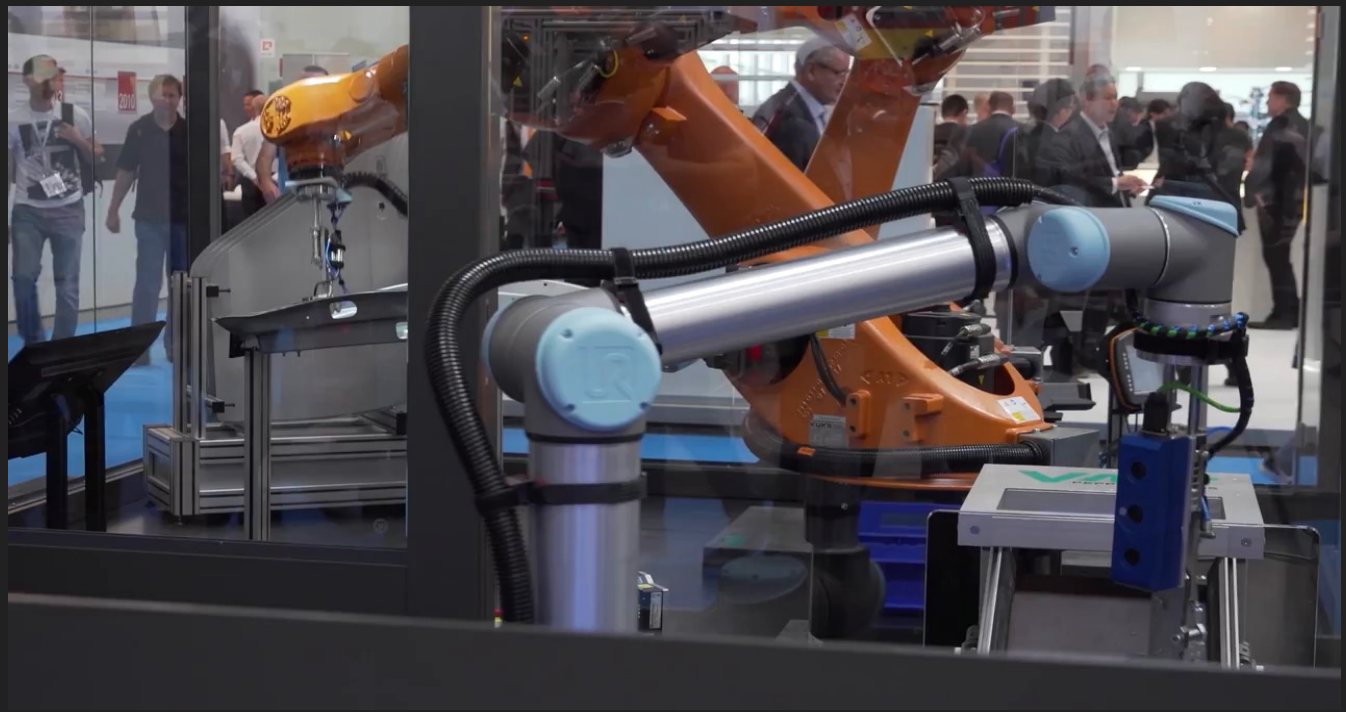
- IFR president Junji Tsuda -

Automatica 2018 Theme
Digital transformation in Manufacturing



Automatica 2018 Theme
Digital transformation in Manufacturing

Pickit
ROBOT VISION MADE EASY



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*“Key trends such as **digitalisation, simplification and human-robot collaboration** will certainly shape the future and drive forward rapid development.”*

- IFR president Junji Tsuda -

Pickit
ROBOT VISION MADE EASY

*“Key trends such as **digitalisation, simplification and human-robot collaboration with AI** certainly shaped the future and drive forward rapid development.”*

- IFR president 2020 -

감사합니다 .

구성용

Country Director, Korea

seongyong.koo@pickit3d.com

www.pickit3d.com