SMARTDiS

Smart Disassembly with a Knowledge-based Automation System

FFG Promoting Innovation.

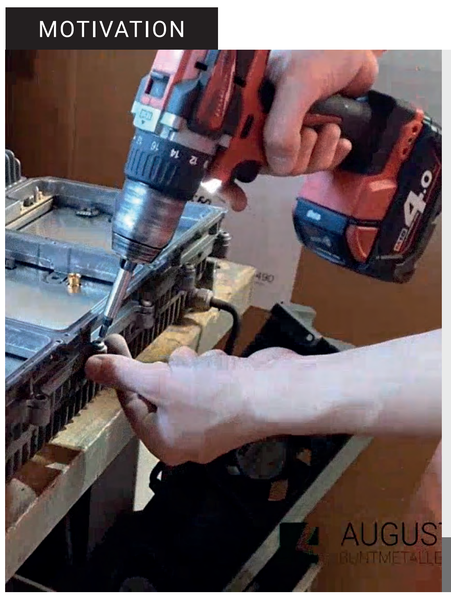
DLR Projektträger

TU WIEN

ACIN AUTOMATION & CONTROL INSTITUTE

PRIA Practical Robotics Institute Austria

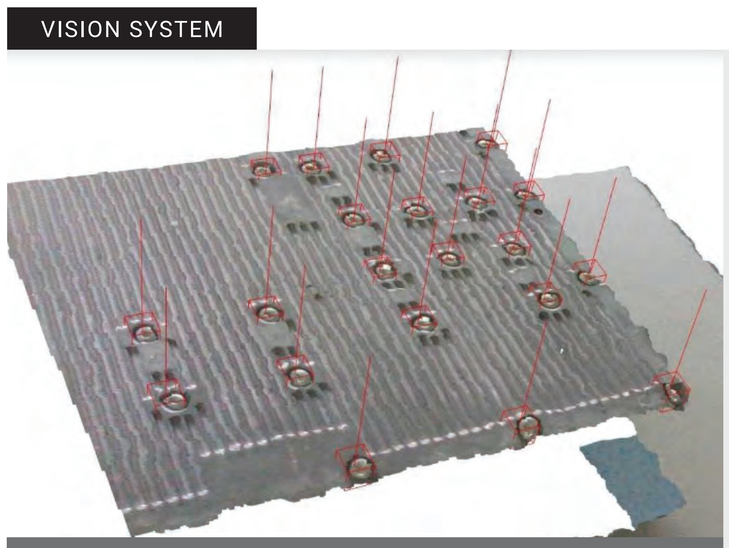
MOTIVATION



- Waste electrical and electronic equipment (WEEE) is currently considered to be one of the fastest growing waste streams in the EU
- Current disassembly processes are mainly performed manually
- Non-uniformity of returned product models creates great uncertainty in the system control and structural configuration
- Physical conditions of product such as degree of degradation, deformation, cleanness, playing also an important role in the disassembly process

◄ Manual disassembly at AUGUSTA GmbH

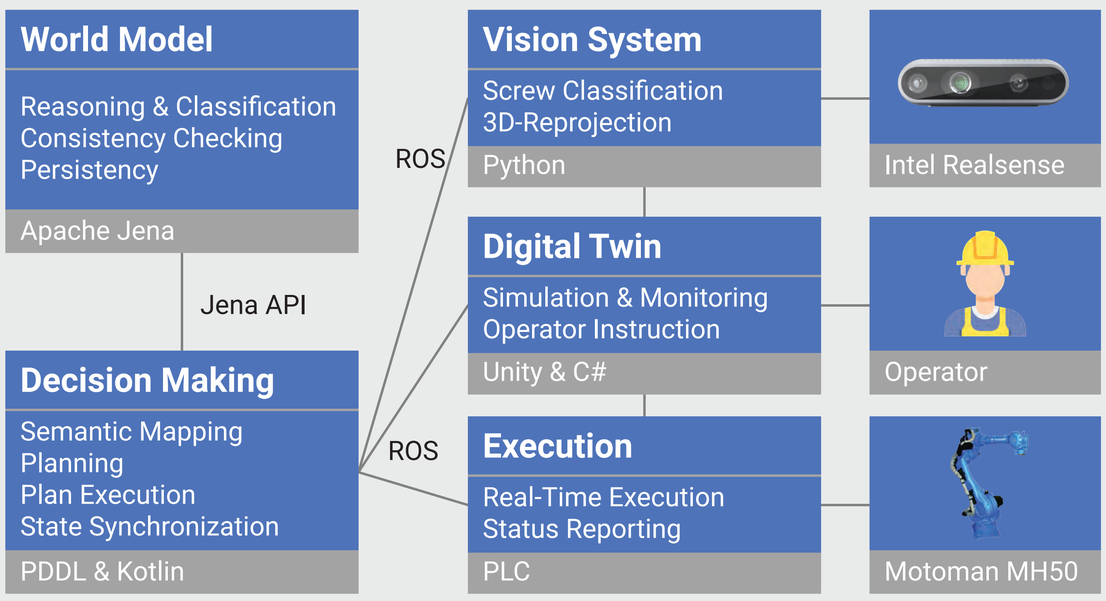
VISION SYSTEM



- Recognition of screws using Convolutional Neuronal Networks
- Learning with 500 generated data pairs (synthetic test data)
- Evalutation with 160 created real-world 3D-scans
- 2D-screw position detection in RGB images and reprojection of screw centers into 3D-model

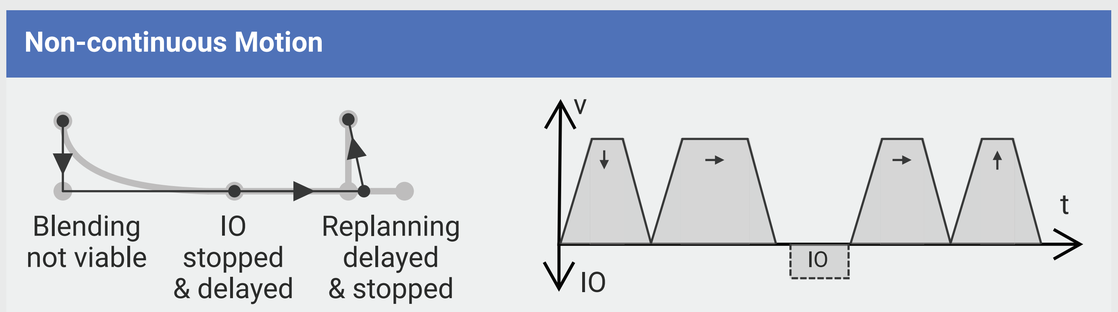
▲ Detected screws of the disassembly object

SYSEM ARCHITECTURE



▲ Overview of system components and interfaces of the disassembly framework

SMOOTH ROBOT MOTION

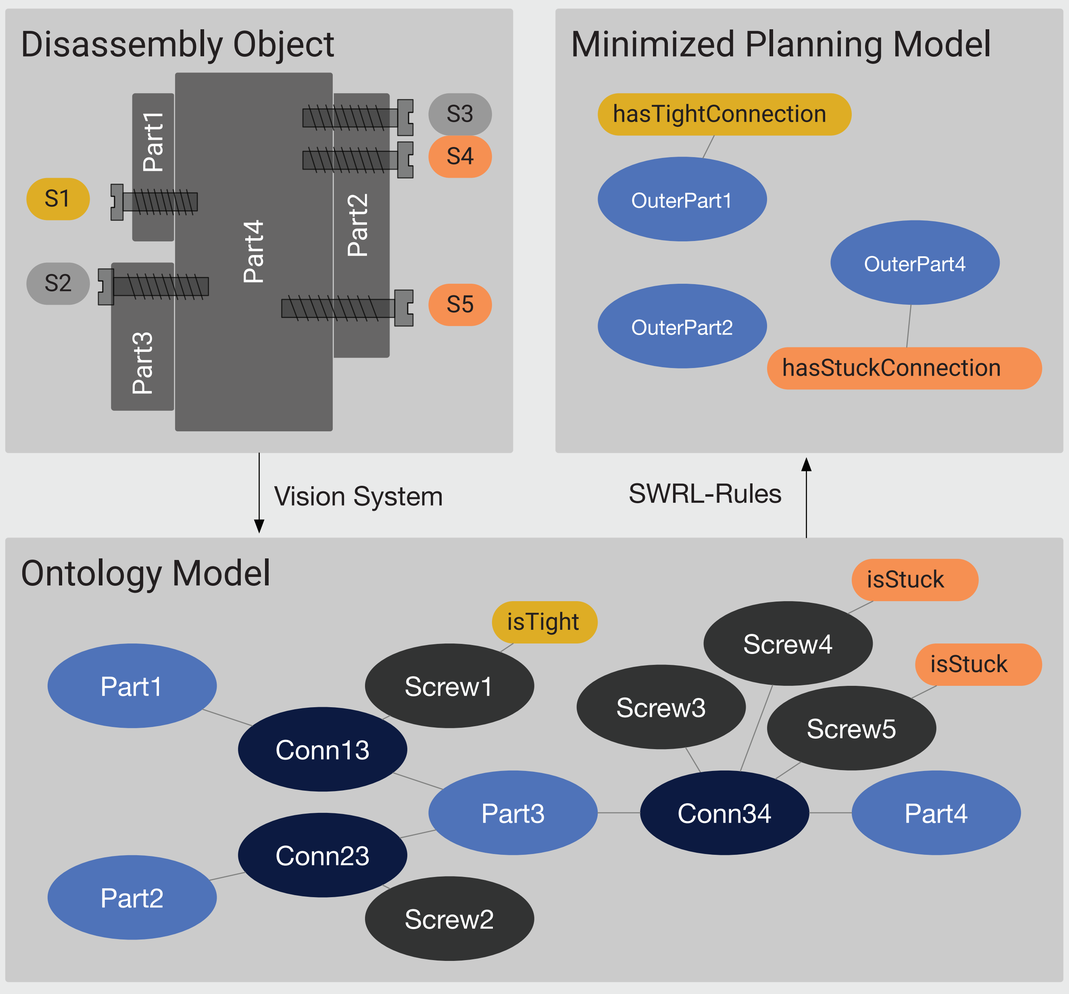


▲ The spatial and timing difference for continous versus non-continous motion

	Time t [s]	Power P [W]	Power SD Φ(P) [W]	Energy W [Wh]
Stopped Motion	43.9	190.0	0.97	2.31
Smooth Motion	23.4	188.3	0.75	1.22
Rel. Difference	53.3%	99.1%	76.8%	52.8%

▲ The energy consumption difference for continous vs. non-continous motion

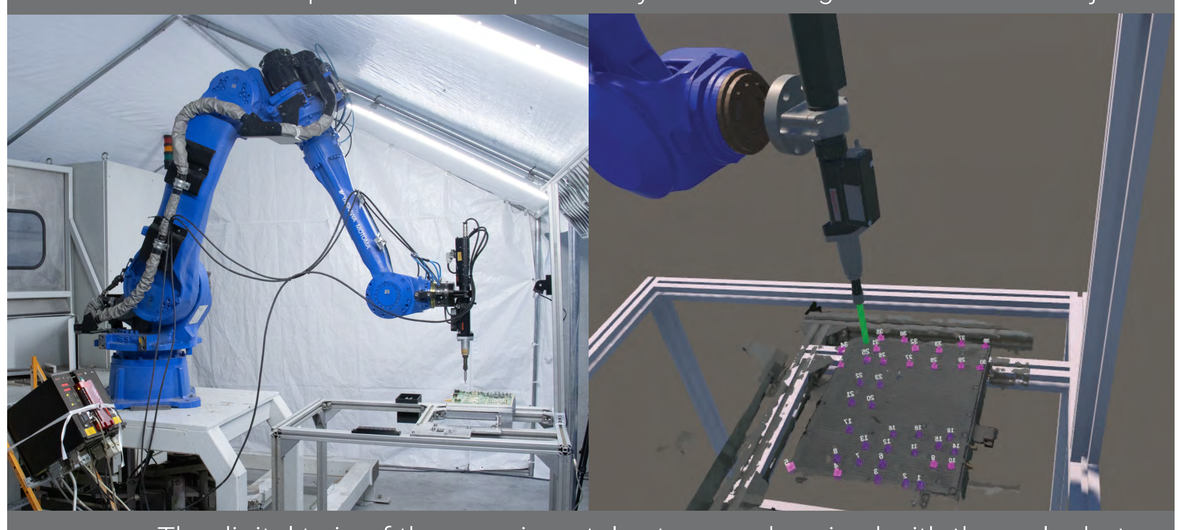
ONTOLOGY ABSTRACTION



▲ The model of the disassembly object in the ontology and its minimized model

EXPERIMENTS

▼ The robot of the experimental setup currently diassembling on the use-case object



The digital twin of the experimental setup synchronized with the real robot ▲

PROJECT PARTNERS

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