recAIcle
Recycling-oriented collaborative waste sorting by continual learning
Pro2Future GmbH, Montanuniversität Leoben, Siemens AG

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recAIcle :: Basic Project Information

- **Application Field:** AI for recycling in a circular economy

- **Technology focus:** Continual learning

- **Research category:** Industrial Research

- **Duration:** 07/22 – 06/25 (3 Years)

- **Goal:** Research on an **AI-based assistance system for workers in waste sorting plants** to improve conditions of work, reduce stress and workload, and increase the sorting quality for better recycling and circular economy.

- **Partners:**
    - Pro2Future GmbH
    - Siemens AG Österreich
    - Montanuniversität Leoben, Lehrstuhl für Abfallverwertung und Abfallwirtschaft

recAIcle :: Project Vision

Problem:

- **Plastic waste** is steadily **increasing** [1]
- EU: "**By 2030 all plastic packaging** should be designed to be **recyclable or reusable**" (EU Packaging waste rules [2], EU Circular Economy Action Plan & Plastics Strategy)
- **Automatic sorting** only achieves **80-90%** "pureness"
- To achieve the currently demanded 98%, **manual sorting** of waste material **is** still **essential** … *but this is "not the most pleasant job".*

Humans are exceptionally well sorters: They combine eyes & haptics (sensors), brains (classifier) and hands (actuators) and adopt to new situations and changed material flows swiftly and continuously.

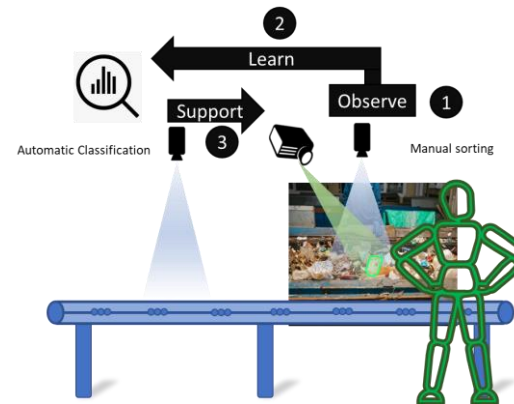Source: https://www.youtube.com/watch?v=EvuNJ_yZi3g

Source: https://www.youtube.com/watch?v=ok4l3-q-5w4

Public funding of recAIcle:

FFG *Forschung wirkt.*

Bundesministerium
Klimaschutz, Umwelt,
Energie, Mobilität,
Innovation und Technologie

Solution: „Continuously learn from the best"

1. Observe human workers doing their work

2. Learn: Continuously and automatically train an ML-model to classify the materials on the conveyor belts.

3. Support the workers by giving light signals via a projector.

[1] OECD, 2022, https://www.oecd.org/environment/plastic-pollution-is-growing-relentlessly-as-waste-management-and-recycling-fall-short.htm
[2] EU, 2022, https://environment.ec.europa.eu/topics/waste-and-recycling/packaging-waste_en

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recAIcle :: Impressions

Smart Waste Characterization Lab in St. Michael (Leoben),
Visit in Sept. 2022

Visit of a Sorting Site in Graz in Okt. 2022
Visible here: Incredibly huge piles of compressed plastic
bottles.