ReconCycle

Self-reconfiguration of a robotic workcell for the recycling of electronic waste

Presented by: Aleš Ude

Jožef Stefan Institute

Motivation for the ReconCycle project

- Standard methodology in electro-recycling: "crush-and-separate"
  - Devices are crushed and split into tiny particles.
  - The parts are then physio-chemically separated into reusable components.
  - Many times this starts with manual work to remove dangerous components.

- Removal of batteries of widely varying sizes and shapes from different devices still done by hand
  - A lot of devices arrive in different states of damage.
 - Manual pre-processing of this kind is inefficient.
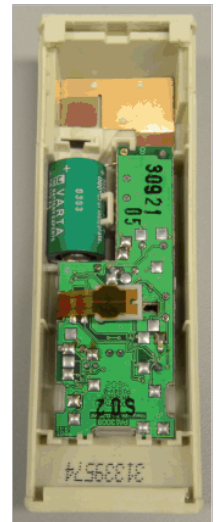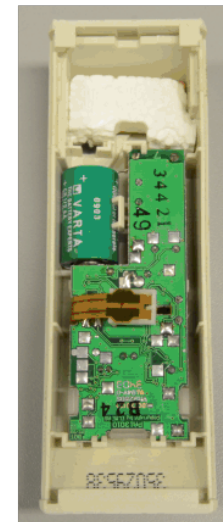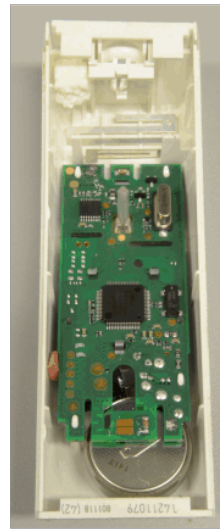
Partners and competencies

- Reconfigurable robotics and robot learning:
  - JSI (Jožef Stefan Institute, Ljubljana, Slovenia), coordinator: Aleš Ude (PI), Timotej Gašpar

- AI and computer vision:
  - UGOE (University of Göttingen, Germany): Florentine Worgötter (PI), Minija Tamošiunaite

- Soft robotics:
  - IIT (Italian Institute of Technology, Genoa, Italy): Manuel Catalano (PI), Giorgio Grioli, Antonio Bicchi
  - QB (qbrobotics, Pisa, Italy): Fabio Bonomo (PI), Riccardo Persichini

- Robot control:
  - TUM (Technical University of Munich, Germany): Sami Haddadin (PI), Saeed Abdolshah

- Recycling of electronic waste:
  - ECYC (Electrocycling, Goslar, Germany): Hannes Fröhlich (PI)
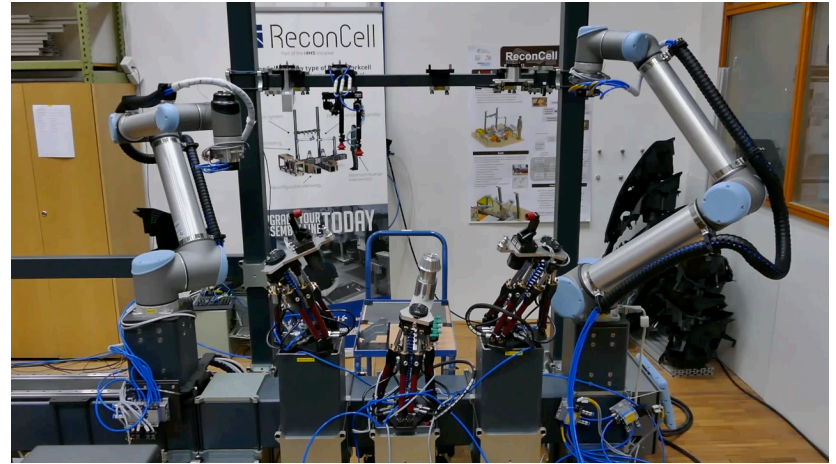
ReconCycle Approach
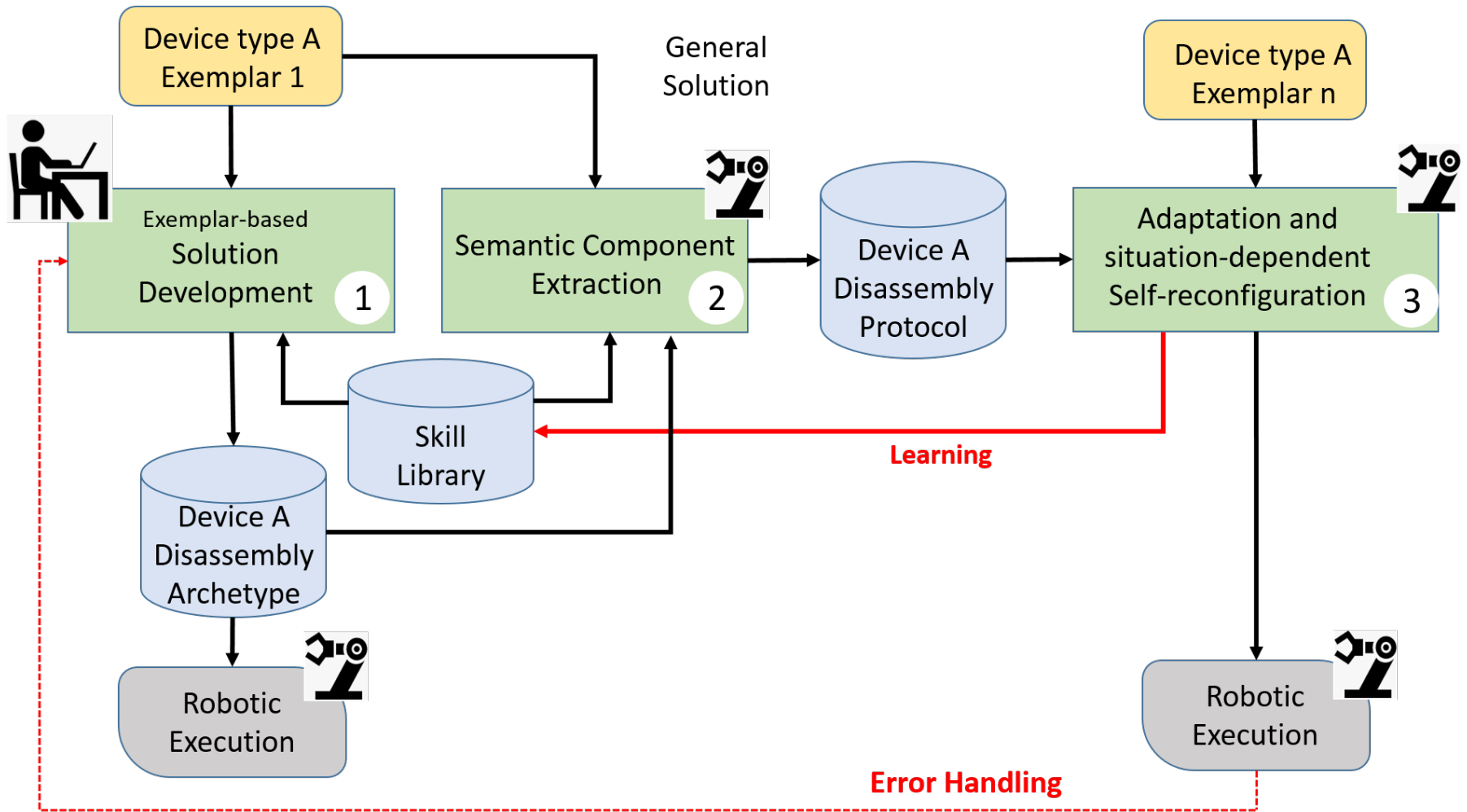
Impact

- ## Industrial impact:
  - Manual pre-processing of electronic waste for "crush-and-separate" approach constitutes a major (cost-)effort.
  - An inappropriate "alternative": ship waste to developing countries
  - Even partial automation of some of these steps (to be implemented in ReconCycle) will make a big difference in terms of profitability, efficiency, and environmental protection.

- ## Scientific impact:
  - Introduce self-reconfigurable hardware and soft robots & tools into recycling domain
  - New sensorimotor learning and AI methodologies to interactively reconfigure the task when changing from one device-type to another.
  - New methodologies for fully automatic reconfiguration of the task within the same model.