A Reconfigurable robot workCell for fast set-up of automated assembly processes in SMEs

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Motivation for the ReconCell project

• Only ca. 20% of production is performed by robots
• Robots are used primarily for large batch size production
  – Most SMEs do, however, also ‘few-of-a-kind’ production
• Set-up times for automated robot solutions are still long → robot solutions are expensive
  – Require engineering knowledge about assembly processes
  – Require programming skills
  – Vision is still an issue
  – Require a lot of fine-tuning by trial and error
  – SMEs avoid the use of robots because of these complexities and costs
• Assembly is still done manually
  → Production moves to ‘low wage countries’
  → Risk: Engineering knowledge follows production
Objectives

• Design a new kind of a **reconfigurable robot workcell**.

• Attractive not only for large production lines but also **few-of-a-kind production**, which often takes place in SMEs.

• Enable fast **reconfiguration** and **re-programming** of the workcell using innovative robotics technologies.

• Reconfiguration and re-programming through well designed **user interfaces** to perform new assembly tasks.
  – Reduce reliance on experts.
ReconCell potential markets

EU MARKET
2,1 MILLION
MANUFACTURING COMPANIES

EU MARKET
21 THOUSAND
POTENTIAL USERS
5% OF COMPANIES WITH ASSEMBLY

EU MARKET
420 THOUSAND
20% OF TOTAL MANUFACTURERS
Main features of ReconCell

• Integration of:
  – Smart, affordable reconfigurable workcell design
  – Programming by demonstration, a teaching interface to guide the user
  – Learning and adaptation capabilities, force control
  – 2D & 3D vision, visual monitoring
  – Cooperative autonomous robots
  – Robot assembly cell simulation and visual robot programming
  – Business modelling technologies

• Evaluation on real use cases provided by SMEs
Workcell design & use cases

• Practical implementation of the workcell
  – Key partners: JSI, MMI, SDU, UGOE, HERMIA
  – Key technologies: 3D vision and monitoring, programming by demonstration, force control, simulation & reconfigurations, business intelligence

• Three use cases as examples of typical assembly problems in SMEs will be used to guide the design process
  – Assembly of an automotive light (ELVEZ)
  – Assembly of a gripper for a wall-mounting robot (Precizika Metal)
  – Final assembly & customization of drive systems and control boxes (LogicData)

• Preparation for exploitation
  – Key partner: Blue Ocean Robotics
Success story: Assembly of automotive light housings

Goal: **Assembly of different light housings (X07 and X82) in one reconfigurable workcell**

Assembly elements: housing, motor, heat shield, bulb holder and screw
Practical implementation
Success story: Reconfigurable hardware

- Flexible fixture
- High speed reconfiguration
- Patented technology
- Reconfigurable frame
- BoxJoint system to connect the frame elements
- Trolleys equipped with plug and produce connectors
- Passive linear units to increase the robot’s workspace
- Breaks to hold a desired position

Upcoming open call

• Scale your production by applying for ReconCell’s Open Call - join Precizika Metal, Logicdata and Elvez as pilot case.

• Application submission begins in November 2017. Send a request via e-mail for more information and get notified when the Open Call is open for registration.

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