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

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Status on few-of-a-kind production

• Only ca. 15% 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 robotic workcells are long, hence 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
• Especially 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 an autonomous robot workcell.
• Attractive not only for large production lines but also for few-of-a-kind production, which often takes place in SMEs.
• Based on new technologies including programming by demonstration, visual monitoring, automatic reconfiguration and executing assembly operations in an autonomous way.
• The workcell can be nearly automatically reconfigured to execute new assembly tasks.
ReconCell Technologies

• Integration of
  – Programming by demonstration
  – 3D vision & monitoring
  – Force-based control, learning and adaptation capabilities
  – Cooperative autonomous robots
  – Smart, affordable reconfigurable workcell design
  – Robot assembly cell simulation and visual robot programming
  – Business modelling techniques

• Evaluation on real use cases provided by SMEs
ReconCell Workflow

Desired product

CAD model & information

Assembly sequence

Skill sequence

Workcell reconfiguration

Skill libraries

Human interaction

Visual programming

Workcell simulation

Assessment & process control

Simulation & programming

ReconCell
- Feedback control
- Force control
- Visual sensing

Business modelling

Execution

Final product

SME business environment
Reconfiguration Concepts
Design Phase

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

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

• Preparation for exploitation
  – Lead partner: Blue Ocean Robotics
Test Phase

Additional SME-provided use cases will be acquired through an open call in the third year of the project

- To be run in cooperation between Blue Ocean Robotics and SDU
- Experiments to be performed at JSI
- Evaluation process:
  - The main evaluation criteria will be innovation novelty (assembly process that is currently done manually), efficiency of implementation, and potential industrial impact
- Selection process:
  - Best applicants will be selected (85 K Euros per project)
  - To be completed by month 31
  - Experiments will start in month 32
Dissemination and business plan

**Public Awareness**
- To ensure a continuous improvement on productivity in our manufacturing and service sector
  - Campaigns on social media
  - Political contacts
  - Collaboration with CSA HMS-Growth and CSA XS214MS
  - Broad and widespread key-messages to more than 0.5 million Citizens in Europe

**Developer Network**
- To support the continued development
  - Multi-media package
  - Direct e-mail marketing
  - Exhibits at leading European fairs
  - 20 organizations and individuals
  - High-value feedback from the network

**Early-Adopter Manufacturing Network**
- To get feedback (use cases, usability, design, business case scenarios) from manufacturing companies
  - Direct e-mail marketing
  - Viral campaigns based on a multi-media package
  - Exhibits at leading European fairs
  - 350 manufacturing companies are engaged
  - Vital feedback on the business case
  - The manufacturing companies feedback

**Distribution Network**
- To contact and engage distribution partners
  - Digital material is send by direct e-mail
  - A large number of system integrators
  - Participation in exhibitions
  - 75 system integrators are engaged
  - High-value feedback on the business plan

**Commercialisation Foundation**
- To start up a financially viable and sustainable enterprise
  - IPR done by Project partners
  - Business plan development
  - Contact to investors
  - Support for appropriate EC instruments
  - IPR protection and patents
  - Business plan
  - Agreements with business partners
Open Calls 2017

- Scale your production by applying for ReconCell’s Open Call - join Precizika Metal, Logicdata and Elvez as pilot case.
- Application assessments begin autumn 2017. Send a request via e-mail for more information and get notified when the Open Call is open for registration.
- Advertise Open Calls in your DIH-network

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Thank you for your attention!

ReconCell

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