Robotics supports the food industry sector in its transition towards Industry 4.0

Product Watch: Robotics for food processing and preparation

Industrial robotics for food processing and preparation, including collaborative robots for repetitive tasks in food preparation, may help tackle challenges within the natural (e.g. climate change) or socio-economic (e.g. globalisation) environment, as they enable the flexibilisation and automation of food production processes.

The most significant industrial robot capabilities and their possible benefits to food manufacturers are to:

- **Decrease:**
  - Production cost
  - Material waste
  - Floor space
  - Production time

- **Improve:**
  - Product quality
  - Product uniformity
  - Working environment

- **Increase:**
  - Production rates
  - Flexibility
  - Safety compliance
  - Competitive advantage
  - Efficiency

The robotics value chain comprises of four core steps. Depending on the specific robot type different aspects of the chain are important.

Food robots are industrial robots which are used for food processing activities, like sorting, handling and packing. They may either work without immediate human presence or alongside human workers with varying degrees of human-robot cooperation. Robots characterised by an advanced degree of collaboration capabilities are sometimes referred to as “cobots”. Since food robots have typically originally not been developed for this sector, the supply chain below depicts the generic robotics value chain.

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**Generic food robotics value chain**

**Robot component production**
- Hardware components, e.g.
  - Power systems
  - Leightweight robotic arms
  - Different sensors and drives (vision, tactile, force)
- Software components, e.g.
  - Robotic learning
  - Object recognition
  - Navigation

**Robot manufacturing**
- Integration of components into robots, e.g. via
  - Original robot designer supplier (branded products)
  - Original Equipment Manufacturer

**Robot system integration**
- Integration of ready robots into a larger production system

**Robot application**
- Applications in various types of food processing, e.g.
  - Material handling (sorting, transport, loading)
  - Material processing (slaughtering, reduction, separation)
  - Assembly (mixing, assembling of pre-prepared ingredients for food delivery)
  - Packaging and palletising

Research & Development (R&D) actors and technology providers

Governing and supporting bodies, public and private partnerships (PPPs) and project consortia

EU competitive positioning for industrial robotics value chain

The EU robotics value chain seems well-equipped to enter further markets such as food processing

Strengths
- Strong technological competences
- Strong robotics industry
- Important agro-food sector

Opportunities
- Technological progress enables more versatile and cheaper robots
- Food as emerging target sector for robotics
- Demand for automation in the food sector

Challenges
- International competition
- Consumer reality-perception dissonance
- Rather weak business case for food robotics

Risks
- Lacking standardisation and interoperability
- Insufficient know-how availability
- Unawareness and lacking competencies of Small- and medium-sized enterprises (SMEs)
- Limited potential for cobots in the food sector

The EU features a strong knowledge base and industrial infrastructure which it can leverage to further innovation. Moreover, it holds a leading position in several key technologies.

Conclusion
The EU robotics value chain is well-equipped to enter other markets such as food processing. Nevertheless, global competition is rising, especially from Asia. Key EU policy issues for the food robotic industry relate to standardisation, guidelines, and certifications.

Outlook
The European (food) robotics value chain might essentially benefit from COVID-19 in the long run.

Impact of COVID-19
Albeit possible turbulences in the short and middle run, the European (food) robotics value chain might essentially benefit from COVID-19 in the long run.

About the Advanced Technologies for Industry (ATI) project
The ATI project – funded by the European Commission – supports the implementation of Europe’s new growth strategy with a systematic monitoring of technological trends and reliable, up-to-date data on advanced technologies.