Visions to Products

Industry 4.0
Spotlights of a study

In our study "Point4Micro" potentials for production of Microsystems down to a batch size of 1 by combination of micro assembly technologies and concepts for Industry 4.0 were identified.

Internet of Things (IoT), Industry 4.0 and Cyber Physical Systems (CPS) are the latest key words having enormous consequences on next-gen hardware components and microsystems. A huge demand of novel sensors and actuators is expected that are able to perceive, communicate and interact with their environment in manufacturing processes. For production of novel hardware modules new challenges in packaging and assembly technology will come up. It will have a great influence in diversity, integration depth or miniaturization, reliability and costs. "More than Moore" systems with small power consumption, small size and small weight are required.

While standardized interfaces are present on wafer level the packaging and assembly technology has to provide such interfaces to the environment for the individual application.

Besides a demand survey at several industrial enterprises the study addressed exemplarily topics with relevant use cases that were identified.

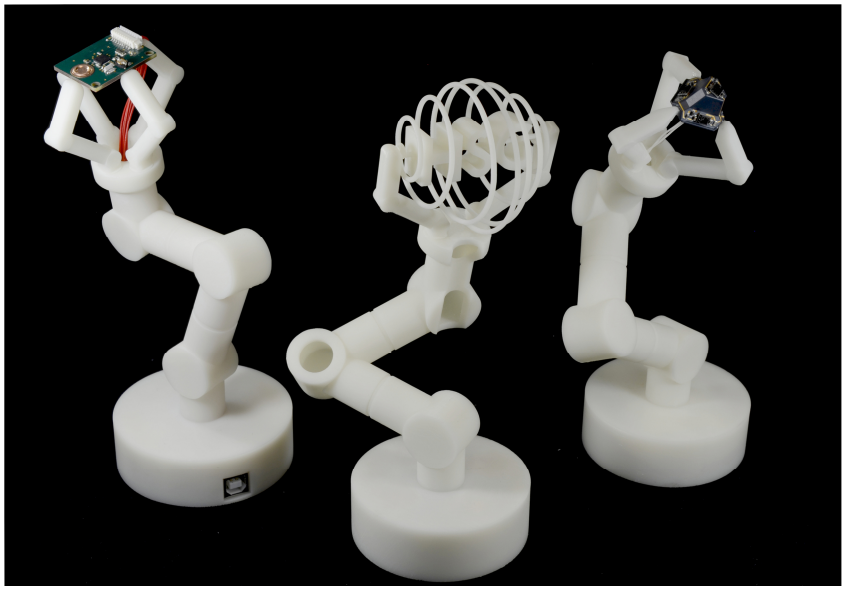

Fig. 1: PCB based ambient sensor and 3D distance sensor

Spotlight 1 – PCB based ambient sensor

Modular sensor system for monitoring of temperature, pressure, humidity and ambient light:

- Analysis and optimization of production processes
- Component specific failure analysis based on ambient parameters

Spotlight 2 – 3D distance sensor

Distance detection in real time based on a 3D-MID:

- Collision prevention e.g. in tooling machines
- Optimization of traverse paths in pick-and-place machines
- Presence detection

Spotlight 3 – Generative methods

Manufacturing methods for 3D components without tools for production of individual products:

- Electrical functionality of printed 3D substrates
- Packaging of hybrid electrical modules

Spotlight 4 – Traceability

Identification without markings based on random microstructures of technical surfaces

- Traceability already at injection molding process
- Protection against forgery
- Suitable for micro components

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