COGNITIVE INDUSTRIAL SYSTEMS

WorkIT/Guide/SeeIT
Workflow Recognition and Guiding



Georgios Sopidis¹, Michael Haslgrübler¹, Birgit Ettinger³, Alois Ferscha¹²

Pro2Future GmbH¹, JKU-IPC (Institute of Pervasive Computing)², KEBA AG³

- ¹ Science Park 3, Altenberger Strasse 69, 4040 Linz, Austria
- ² Science Park 3, Altenberger Strasse 66, 4040 Linz, Austria
- ³ Gewerbepark Urfahr, Reindlstraße 51, 4040 Linz, Austria



MOTIVATION & GOALS

- Recognition of micro activities e.g. Screwing detection in industrial processes.
- Collaboratively behaviour of human and machine.
- Capturing Workflow Human Activity Recognition using: (Wearable- & Biometric-Sensors, Eye- & Hand-Tracker)
- Identification of bottlenecks within the assembly procedure.
- Quality Control of the manufacturing operation by providing guidance and support to novice workers in distracting or vague situations.
- Confirmation for the successful completion of a task.

Project FactBox

Project Name WorkIT
Project ID MFP1.1/DP1.1
Duration 39 Months

Area 1

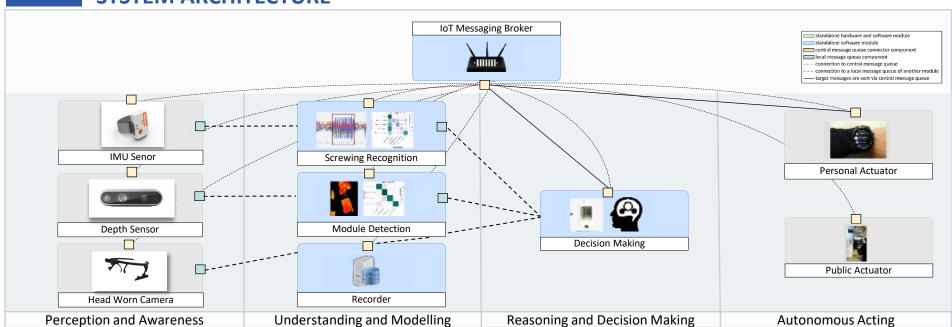
Perception and Aware Systems

Project Lead

Prof. Dr. Alois Ferscha

CONTRIBUTION **APPROACH Preprocessing** Visualization and **Data Collection** Learning Classification Validation **Scientific contribution** Detection of micro-activities(small movements with hands) in the Segmentation **Sensor Data** Supervised Micro-Activities **Evaluation** Deep neural networks. filed of human activity recognition using mainly IMUs. Furthermore Acquisition methods approach, Semantic Recurrent neural Supervised: Confusion detecting the stage of the assembly process, based on depth sensors. Hand Screwing networks optimized for matrices, Metrics Manual Screwing Convolutional neural labelling). application scenario (Accuracy, Precision, networks, Ensemble • Electrical Screwing Recall, F1 score). Inertial Measurement **Economic contribution** Wrench Screwing Unit (IMU). Feedback Reduce training time for novice workers Reduce the cost of rework for the companies Depth Sensor Workstep Workstep detection

SYSTEM ARCHITECTURE



Contact: Georgios Sopidis, MSc, Pro2Future GmbH, georgios.sopidis@pro2future.at, +43 732 2468 - 9470 **Acknowledgement:** This work was supported by Pro²Future (FFG, 854184) and KEBA AG.























