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Robotics is an interdisciplinary field that integrates computer science and a number of engineering fields like mechanical and electrical engineering, mechatronics, bioengineering, and others. Robotics develops machines that can substitute for humans and replicate human actions. The most widespread application of robots is manufacturing. One of the leading suppliers of intelligent automation solutions is KUKA AG, a German manufacturer.

The history of KUKA starts in 1898 with Johann Joseph Keller and Jacob Knappich in Augsburg. They founded an acetylene gas plant in Augsburg, thus allowing cost-effective operation of domestic and street lightning. The company name, KUKA, is an acronym for "Keller und Knappich Augsburg" [1]. In the 20th century KUKA begins market expansion in other areas. The product range is extended beyond welding systems and large containers. In the early 70-s Europe's first robot-operated welding transfer line was built by KUKA for Daimler-Benz. KUKA also wrote its history as a robotics pioneer with the world's first industrial robot with six electric motor-driven axes. Today, the KUKA Robotics Corporation continues to grow and applies its expertise in the logistics and healthcare sectors [1].

Flexible manufacturing in variable batch sizes with utmost efficiency is the challenge for the production of the future. To meet it, perfect human-machine interaction will be required. Robots and humans work hand in hand. Processes

and data are digitally accessible to everybody. The Internet of Things (IoT) has arrived in industry, and the digitization is well advanced. With its products and digital services, KUKA provides the companies with the benefits of Industry 4.0.

Alongside conventional industrial robots, collaborative, sensitive robots (cobots) can work together with production workers even more directly and precisely, facilitating their workload. With the integrated sensors, cobots make it possible to automate delicate assembly tasks ranging from automotive transmissions to handling flexible parts. People and robots work safely together and share the same workspace without any concerns. The "robot colleague" is a reality at KUKA [2].

Cobots play a crucial role in Industry 4.0. On the one hand, they are part of modern production. On the other hand, they collect data which forward all relevant information to the IT systems in real time. These immediately process the information and feed it back to production. Hence, companies are gradually optimizing manufacturing [2].

With the cobot KUKA LBR iiwa workers can perform their tasks more efficiently, more accurately, more focused. Thanks to its joint torque sensors LBR iiwa can detect contact immediately and reduces its level of force and speed. It can also find small, delicate components in next to no time without assistance. The LBR iiwa's controller allows it to simplify the quick start-up of complex applications. Monotonous tasks are performed reliably and independently. Areas of application range from assembly or adhesive bonding processes in industrial production to applications in medical or service sectors [2].

For example, thanks to KUKA's HRC expertise, Ford Company is already several ideas ahead with the automation of its production lines. On the headlight system test stands for the Ford Focus, for instance, two KUKA LBR iiwa robots perform the ergonomically unfavorable fine adjustments of the fog

lights while the operator adjusts the conventional headlights. Humans and robots work on the same vehicle without additional robotic safety equipment. As well as facilitating the workload of the worker, they also achieve greater adjustment quality and valuable time savings [3].

One more car maker that benefits from KUKA automation solutions is BMW Group's Dingolfing Plant. Today the employees work together with their collaborative colleague: an LBR iiwa lightweight robot from KUKA. With the HRC solution developed specifically for the customer, KUKA enables the car manufacturer to automate hard production steps previously carried out manually and ease the workload [3]. Thus, the KUKA contribution to the factory automation is, obviously, great. The company occupies one of the leading positions in export of industrial robots and solutions for factory automation. Large companies as Boeing, Space X, BMW, Ford and others are partners of KUKA. This confirms the quality of the company's products.

References:

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