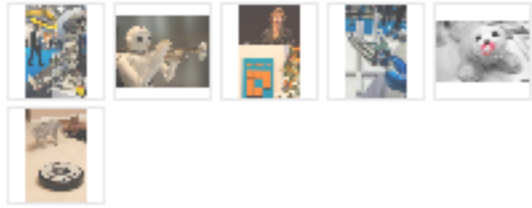


Robot - Colleague and Friend

Image preview



ONLY FOUND IN science fiction movies a few decades ago, robots have in the meantime found their way into many new areas of our lives. In many industrial sectors, they guarantee a competitive and cost-effective production. Due to the continuous development of hardware and software, companies and scientists are creating automated helpers, which do more than merely relieve and support humans in routine tasks. In some countries, the technology is to help tackle the demographic challenges of the future.

Europe

has initiated the world's largest current research and innovation program in the area of civilian robotics. At the beginning of June, the vice-president of the EU commission Neelie Kroes launched the SPARC initiative at the international trade fair "Automatica" in Munich, in which the EU has invested 700 million euros. 180 companies and research institutions are working together in this context to enhance Europe's position in the global robotics market. The

continent is currently responsible for approximately one third of the world's industrial robot production. The initiative wants to increase this share to 42 percent and, in addition, create 240,000 jobs. Currently the market has a volume of 22 billion euros per year. 60 billion euros could be achieved by 2020. "The use of robots is growing continually around the world, especially in fast-growing economies such as China, but also in other countries in the Far East. In many countries, robots are the most important and often only means for carrying out specific industrial tasks. In many industries, they guarantee the highest levels of productivity and quality as well as the competitiveness of the companies," explains Arturo Baroncelli, President of the International Federation of Robotics (IFR). Based on the results of the quarterly statistics, the International Federation of Robotics estimates that around 168,000 industrial robots were sold worldwide in 2013. This represents a new alltime high in demand. Until 2016, the number of global deliveries is to rise by a further five percent per year. By that date, 1.7 million units would be in use internationally. More than half of the sales are currently in Japan, China, the United States, Korea and Germany. The highest density of industrial robots is found in the Republic of Korea. In 2012, 396 units were used per 10,000 employees. In Japan and in Germany, 332 and 273 units were used respectively.

Main user of the automated helpers is still the automotive industry. But also the food and beverage industries are large growth markets. "The price level of robots has fallen dramatically, thanks to technical improvements and the benefits of mass production. At the same time, the performance potential could be extended by combining the machines with new systems or software packages," explains Baroncelli. According to the President of the IFR, a major challenge lies in the direct cooperation between man and machine. Traditionally, industrial robots are separated from employees with fences and other protective measures. In order to enable direct cooperation in the future, manufacturers and research institutes are working on more extensive security measures. At the Automatica 2014, the Institute for Cognitive Systems at the Universität zu Lübeck demonstrated how robots with an artificial skin could move better and safer. A sensor system ensured that the machine would stop moving at the touch of a feather.

In addition to a man - robot cooperation, another major theme at this year's Automatica is service robotics. The IFR has calculated that at least 95,000 domestic and industrial helpers will be sold between 2013 and 2016, valued at 12.3 billion euros. The improvement of the hardware and software for robotics technology has led to more and more uses and applications since the turn of the millennium. In medicine, robots are often used in surgery, for example to support doctors with minimally invasive surgery. They are also deployed in inaccessible or hazardous areas which are not accessible to humans, performing inspection and maintenance tasks in jet engines, nuclear power plants and offshore wind farms. In agriculture there is a large demand for milking robots. In addition, the machines are also used in the fields for planting, harvesting or cutting crop. "The unique feature of service robotics is that it combines many different disciplines," says Baroncelli. "Although the production of the machines is based on industrial robot technology, other areas of specialization are also integrated, such as artificial intelligence, medicine, neurophysiology and biology."

For several years, intensive research work has been performed in the field of service and assistance robotics with the aim of addressing future challenges, including demographic change. In its budget for 2013/2014, the Japanese government has made a provision of 2.39 billion Yen, which is about 17 million euros, for the development of automated helpers for the elderly. The Ministry of Economic Affairs wants to subsidize 24 companies in the development of healthcare robots, so that in future they can be produced in mass. By 2055, an estimated 40 percent of the population of the island nation will be over 65 years of age. The Ministry of Health has calculated that 2.4 million people are needed as healthcare workers by then. Around 1.49 million people are currently employed in this sector. Japanese companies have developed different means to aid senior citizens in finding a good life in old age. Toyota has produced a walk assist robot, Panasonic a special robot with 24 fingers, which can wash hair and massage the head. Honda's personal mobility device "Uni-Cub", which is shaped like a penguin, assists elderly people in covering longer distances.

Through the development of this technology, for example in the field of voice and face detection, the robots are getting smarter and assuming more complex tasks. Advanced models can perceive and respond to their environment, are adaptive and solve emerging problems independently. According to experts, however, it will still take a few decades before household robots with the ability to read aloud or perform routine shopping tasks will be produced in series. Until then, various ethical and legal issues still need to be resolved, such as who is liable for errors, and whether the machines are subject to morality. In many countries, the acceptance within the society must also be improved before service robots have a future in domestic areas such as healthcare. "In the western world, there are significantly more reservations than in highly technical oriented countries like Japan and South Korea," says IFR president Baroncelli. "But I think that it is only a matter of time until the practical benefits have been tested and are appreciated in all parts of the world. Personally, I bought myself a vacuum robot for Christmas! After initial scepticism, it is now used by everyone in the family. The only problem is that the cat does not really like it."

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