

# Autonomous Robotics

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## Shaping the digital enterprise - China as a cradle for innovation in autonomous robotics

The word “robot” has stepped out of science fiction. Robots have become a revolutionary element in the industrial world, as work mates and even competitor of human workers in many industrial branches. Thanks to development of artificial intelligence, robots have evolved from stationary machines for simple, repetitive motions to intelligent systems for sensing, learning and actuating autonomously. They even collaborate with other robots and humans seamlessly as clusters.

The robotics market foresees a revolution initiated by lightweight robots that cooperate with humans in the workplace without fences. Advanced teaching and a fast ROI have lowered the barriers to make this robot class our work mate.

As the world’s leading manufacturing country, China anticipates a huge demand for new installations of robots in its factories: shifting the focus from quantitative to qualitative growth, economic plans call for optimizing the current economic structure and strengthening innovation. China’s manufacturing industry also needs an upgrade. Modernization of this entire sector is generating market momentum: China is the world’s largest market for robotics. In 2019, some 40 percent of the world’s industrial robots will be sold in China alone, according to the 2016 World Robotics Report published by the International Federation of Robotics (IFR).

According to the Chinese Institute of Electronics, China’s industrial robot market is expected to reach USD 4.22 billion in 2017. According to MIIT (the Ministry of Industry and Information Technology of P.R. China), China aims to achieve major technological breakthroughs in key robotics components and high-end technologies by issuing a development plan for the robotics industry during the 13th Five-Year Plan and aims to produce 100,000 Chinese-branded industrial robots annually by 2020.

## Hype or trend? What does autonomous robotics mean for Siemens?

As a global leader in automation and digitalization solutions, Siemens is committed to the continuous enhancement of its leadership position. At the boundary to the physical world of conventional manufacturing, robots are a



perfect extension of Siemens' industrial automation business – and China is the strategic battlefield for realizing the Digital Enterprise concept and thus defending leadership in industrial automation.

To achieve these goals, Siemens is combining its industrial automation portfolio with autonomous robotics controls and realizing top-notch manufacturing solutions, investing heavily in China's future and partnering with the country on its way to digitalization. The development of robotics will be concentrated in China. Together with local partners, Siemens China will lead the company's global R&D in autonomous robotics control and build an open innovation ecosystem with the government, SME and universities by:

- concentrating research activities in China, addressing the local needs of the robotics market: Siemens is establishing a Robotics Center at Tsinghua University, Beijing, as a platform for global university collaboration. The center will start operation in late 2017. Siemens expects its CKI partners to produce leading-edge research results.
- creating a local ecosystem in which customers will co-create with Siemens researchers. To achieve this goal, Siemens aims to leverage the innovative power of the Robot Operating System (ROS) community to realize its technological ideas.
- continuing research at the Siemens China Innovation Center: based on the center's initial achievement, research at the center utilizes existing Siemens technology, for example, PROFINET/OPC UA, and is fully compatible with *Industrie 4.0*. This technology enables the superior performance required by multi-axial robotic controls at a competitive price level. Other plug-and-play edge devices are also in development, with the aim of expanding functionalities beyond traditional tasks.
- developing of engineering tools and digital twins that are seamlessly compatible in order to further solidify the user base of Siemens industrial automation systems and lower the entry barrier of robotics OEMs and system integrators.
- enhancing our TIA platform by seamlessly incorporating the state-of-the-art technologies that the robotics industry has to offer.