

THE TECHNICAL REGULATIONS OF ROBOTICS

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Abstract

This article discusses technical regulations in the field of robotics, their practical application and importance. Technical regulations are important in the creation of robots and their safe operation. The article also provides information about the main norms and standards used in robotics. This article covers issues of current importance for specialists in the field.

Keywords: Robotics, Technical regulations, Safety, Design, Standards, ISO 10218, ISO 8373, Safety precautions, Industrial robots, educational robots.

Introduction

Robotics is a field of science located at the intersection of technology, computer science, and engineering, and it is considered one of the main directions in the development of modern technologies. Today, robots are widely used in various sectors, including industry, healthcare, agriculture, the military, and many other areas. However, ensuring the efficiency and safety of activities in the field of robotics requires strict adherence to well-defined technical regulations. Technical regulations govern the processes of designing, manufacturing, testing, and operating robots. This article discusses the significance of these technical regulations and the necessity of compliance with them. Additionally, the article also highlights the challenges encountered when implementing technical regulations in practice.

Main Technical Regulations in Robotics

1. Safety Regulations at the Design Stage:

- Robots must meet safety requirements.
- The safety of electrical supply systems, mechanical structures, and software must be ensured.
- Safety measures at the design stage must be verified during initial testing.

2. Materials and Components Selection Regulations:

- Materials should be safe for the environment and human health.
- Only certified and quality-controlled components should be used.
- The use of recyclable materials ensures environmental sustainability.

3. Robot Testing Regulations:

- Every robot must undergo functional testing before operation.
- During testing, the robot's performance efficiency and safety are evaluated.
- The level of preparedness for emergency situations should be determined during testing.

4. Operational Regulations:

- Users must adhere to the operational manuals when using robots.
- Environmental conditions (temperature, humidity, pressure, etc.) must be within the technical requirements.
- Operators' technical skills should be continuously improved.

5. Software and Update Regulations:

- The robot's software must be regularly updated.
- If software errors are identified, they must be corrected immediately.
- Every software update must undergo safety testing.

International Standards in Robotics

Additional Information: New technologies, such as artificial intelligence (AI) integration and robots based on the Internet of Things (IoT), are driving the development of new standards and safety requirements in the field of robotics. Currently, global standards such as ISO 10218 and IEC 61508 are widely applied and play a crucial role in ensuring safety. Recently, new research has been conducted to develop specific standards for medical robots. For instance, new regulations are being created to make robotic surgery safe and effective. Standards like ISO 10218 and ISO 8373 provide guidance for manufacturers worldwide in the field of robotics. These standards are crucial for ensuring the safety and efficiency of industrial robots. Recently, the methods for evaluating the safety of robot software based on the IEC 61508 standard have been improved. This process focuses on enhancing safety levels when robots are operating in a networked environment. Furthermore, the requirement for each software update to undergo safety testing has become a mandatory regulation. Standards in medical robotics also require a unique approach. For example, the operation and movement of surgical robots demand the highest precision, which is why international standards regulate these processes.

At the international level, standards like ISO 10218 (Safety of Industrial Robots) and ISO 8373 (Robot Terminology) are applied in the field of robotics. These standards are aimed at ensuring safety during the design and operation of robots. Additionally, the IEC 61508 standard serves as a foundation for general safety regulations.

International standards act as guidelines for robot and component manufacturers. Through these standards, the safety and efficiency of technological processes are enhanced. Furthermore, the use of standards in robotics research ensures that the results are precise and comparable.



Practical Application of Technical Regulations

Additional Information: The industrial robots developed in accordance with the ISO 10218 standard provide a clear example of how safety can be ensured and process efficiency can be improved. For instance, in automotive assembly lines, robots are able to work alongside humans while adhering to safety regulations. In the application of industrial robots, high efficiency and safety levels are guaranteed in compliance with ISO 10218. For example, in car manufacturing plants, robots help facilitate repetitive tasks performed by humans, thus speeding up the process. Additionally, this standard requires the provision of safety barriers and emergency stop buttons when working with robots.

The practical application of robotics technical regulations plays a significant role in various sectors such as industry, healthcare, education, and agriculture. In industry, robots ensure safety on production lines while automating the process. For instance, in automobile factories, robots assist in assembling and recycling metal parts. These processes are managed in accordance with the ISO 10218 standard. In healthcare, robotics has made unique advances. Surgical robots ensure safety and precision, which enhances the effectiveness of operations. Additionally, medical robots assist in patient care, such as robots delivering medication. In agriculture, the development of robotics enables automated sowing, harvesting, and irrigation in fieldwork. Technical regulations are crucial for ensuring the ecological safety of robots. The practical significance of technical regulations is demonstrated in the beneficial outcomes that result from compliance. The following examples confirm this:

1. **Industrial Robots:** Robots used in industry are developed in accordance with the ISO 10218 standard. This ensures safety while improving process efficiency.
2. **Medical Robots:** In healthcare, robots designed according to technical regulations guarantee the accuracy and safety of operations.
3. **Robots in Education:** The safety of robots used in educational institutions enhances students' health and increases the effectiveness of their technical learning process.

CONCLUSION

In the future, technical regulations are expected to be enriched with new standards aimed at enhancing automation and improving safety. Additionally, the development of technologies will further increase the positive impact of these regulations on human life. In the future, technical regulations will expand not only in the industrial sector but also for domestic robots used in everyday life. These regulations will help make robots more convenient and safe for human life. Moreover, strengthening international collaborations in the field of robotics will lead to the development of these regulations. Robotics technologies are rapidly advancing on a global scale, and the importance of technical regulations is increasing accordingly. In the future, strengthening international cooperation in robotics and implementing new regulations will contribute to making human life easier. Furthermore, technical regulations play a significant role in the field of education. The use of robots in education helps develop technical thinking, enhance students' creative potential, and cultivate practical skills. This, in turn, lays



a solid foundation for future inventions and innovations. In conclusion, adhering to robotics regulations ensures safety and provides the opportunity to apply modern technologies effectively. Technical regulations in robotics are essential for creating and operating robots safely and efficiently. Failure to comply with these regulations can lead to various risks. Therefore, specialists working in the field of robotics must comply with these technical regulations. With the development of technologies, these regulations will be continuously updated and adapted to meet the demands of the time. Robotics forms the foundation of future technologies. By adhering to the established regulations in this field, we not only advance technology but also ensure its positive impact on human life.

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