

AUTONOMOUS MEDICAL ROBOTS POWERED BY AI: INNOVATIONS, LIMITATIONS, AND FUTURE PROSPECTS

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Abstract: The development of the fields of artificial intelligence and robotics is bringing about revolutionary changes in the field of Medicine. Autonomous medical robots are creating new opportunities in maintaining human life and improving health. This article will analyze in detail the innovations, existing limitations and future prospects of autonomous medical robots that work using artificial intelligence.

Keywords: artificial intelligence, robots, robotics, medicine, health, rules, regulatory documents, innovation.

Autonomous medical robots are robots that perform complex medical tasks without human assistance or minimal human intervention. They are able to carry out diagnostics, surgery, care, distribution of medicines and many other medical services. The development of artificial intelligence allows robots to learn complex tasks, make decisions and adapt themselves to the environment. These robots make it possible to quickly and accurately analyze large amounts of data, constantly monitor the condition of patients, as well as perform surgical procedures in high accuracy. In the field of innovation, autonomous medical robots include many new technologies. For example, robotic surgeons have significantly improved traditional surgical techniques. They provide unsurpassed accuracy and stability when performing minimally invasive surgeries. At the same time, with the help of artificial intelligence algorithms, robots will be able to personalize the surgical strategy, studying the individual anatomy of the patient. In the diagnostic field, however, autonomous robots are achieving high efficiency in analyzing medical images, detecting pathologies and even detecting early stages of diseases. All this serves to improve the quality of treatment of patients.[1]

Also, autonomous medical robots play an important role in improving the efficiency of the health system. They reduce the workload of doctors, since many repetitive and complex tasks are performed by robots. For example, tasks such as dispensing drugs in exact doses, monitoring patients, and even providing emergency response are being performed by robots. This increases the speed and quality of health services, and also reduces human error. However, there are a number of limitations in the development of autonomous medical robots. One of the biggest problems is technological and ethical issues. Errors in the decision-making process of robots can pose a serious threat to the lives of patients. Therefore, the safety and reliability of robots should be ensured at a high level. In addition, the issues of confidentiality of information obtained by robots and protection of personal data of patients are also of

great importance. Ethically, however, there are questions as to whether robots can fully take the place of a person and whether the doctor-patient relationship will change. These issues are widely discussed in society, and in the future it is necessary to develop clear rules and norms for them. There are also technological limitations. Fully independent operation of autonomous robots requires highly advanced artificial intelligence and sensor systems. Nowadays, these systems still have limitations in the performance of some complex tasks. For example, in uncertain and changing conditions, the adaptation and quick decision-making of robots is not yet perfect. [2]

In addition, the production and maintenance costs of robots are also high, which prevents their widespread introduction. And the prospects for the future look very bright. Rapid development in the fields of artificial intelligence and robotics further expands the capabilities of autonomous medical robots. It is expected that in the coming years, more effective cooperation of robots with Man, an increase in their learning abilities and independence in the performance of complex tasks will increase. Also, the possibilities of telemedicine and remote surgery will expand, and medical services will be partially freed from geographical restrictions. This makes it possible for patients living in remote areas to receive high-quality medical care. Also, robots using artificial intelligence play an important role in the creation of individual health systems. They help develop personalized treatment plans, taking into account the patient's genetic information, lifestyle, and other individual characteristics. This ensures the prevention and effective treatment of diseases. In the future, the integration of robots into the human body, such as through implants and prostheses, is expected to create new health opportunities.[3]

Conclusion: In conclusion, autonomous medical robots using artificial intelligence are providing great innovation in the field of Medicine. They provide high efficiency and accuracy in diagnostics, surgery and patient care, reduce the workload of doctors and further develop the health system. However, the security, ethical issues and technological limitations of these technologies are still waiting for a solution. In the future, the further development of artificial intelligence and robotics will become an important factor in improving human health, expanding the capabilities of autonomous medical robots. At the same time, effective cooperation between society, legislation and medical professionals is necessary for the safe and effective application of these technologies. The future of autonomous medical robots creates opportunities to bring human health to a new level, and ongoing research on this path raises high hopes.

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