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ROBOTICS AND SOCIETY

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ABSTRACT

Robotics is an important area of modern science and technology. Robots are used to perform tasks that may be repetitive, physically demanding, precise, or unsafe for people. Their use is expanding across manufacturing, healthcare, agriculture, education, transport, and domestic settings. This paper discusses the meaning of robotics, its major applications, and its possible benefits and challenges for society. It uses a brief literature-based review of published research and institutional material rather than new experimental data. The discussion indicates that robots can improve productivity, consistency, and support for people, but they also raise concerns about employment transitions, safety, privacy, fairness, and accountability. The paper concludes that robotics is most beneficial when human needs, responsible design, appropriate regulation, and education are considered alongside technical progress.

KEYWORDS: Robotics, society, automation, healthcare, employment, ethics, human–robot interaction.

1. INTRODUCTION

Robotics is the field concerned with designing, constructing, programming, and operating robots. A robot is a machine that can carry out physical actions through programmed instructions and, in some cases, sensors and artificial intelligence. Robots range from industrial arms used on production lines to mobile robots that deliver items, assist with rehabilitation, or clean homes. Robotics is closely connected with computer science, mechanical engineering, electronics, and artificial intelligence.

Robots are becoming more visible in daily life because they can help with tasks that require repetition, accuracy, or work in difficult environments. However, their introduction also changes how people work and interact with technology. Research on human–robot interaction highlights the need to consider social and ethical questions alongside technical performance (Wullenkord & Eyssel, 2020).

2. Objectives of the Study

- To explain the meaning and role of robotics in society.
- To identify important areas where robots are used.
- To discuss the main benefits and challenges of robotics.
- To suggest ways to encourage safe, fair, and responsible use of robots.

3. RESEARCH METHODOLOGY

This paper follows a descriptive, literature-based approach. It draws on an academic review of societal and ethical issues in human–robot interaction and institutional publications from UNESCO and the International Federation of Robotics. No survey, interview, or original experiment was conducted. Therefore, the paper presents a general discussion and does not claim to measure the impact of robots in a particular community.

4. Applications of Robotics in Society

4.1 Manufacturing and Industry

Industrial robots can perform tasks such as welding, assembling, painting, packaging, and quality inspection. They can help maintain consistent output and take on repetitive or physically demanding activities. Human workers are still needed to plan operations, supervise systems, maintain equipment, and handle unexpected situations.

4.2 Healthcare

In healthcare, robots may assist with surgical procedures, rehabilitation exercises, hospital logistics, and delivery of supplies. These systems can support healthcare professionals, but they require careful testing, appropriate training, and human oversight because mistakes may affect patient safety.

4.3 Agriculture

Robotic and automated systems can support crop monitoring, precision spraying, planting, and harvesting. Such tools may help farmers manage resources, although their cost, maintenance, and suitability for different farm sizes can limit access.

4.4 Education and Daily Life

Educational robots can help students learn programming, logic, and problem-solving through practical activities. Domestic robots, such as robotic vacuum cleaners, can assist with household tasks. Assistive robots may also support people with disabilities or older adults, while remaining a supplement rather than a complete replacement for human care.

5. Benefits of Robotics

- Efficiency and consistency: robots can repeat defined tasks with reliable precision.
- Safety: robots can be used for some hazardous or physically difficult tasks, reducing human exposure to risk.
- Support in healthcare: certain systems can assist professionals and rehabilitation services.
- Improved access: assistive technologies may help some people carry out everyday activities.
- New skills and jobs: robotics can create demand for programming, engineering, maintenance, and system-supervision skills.

6. Challenges and Social Concerns

- Employment changes: automation may reduce demand for some tasks, so workers may need training and support to move into new roles.
- Cost and inequality: expensive systems may be easier for large organisations to adopt than for small businesses or low-resource communities.
- Safety and reliability: technical failures or poor design can cause harm, especially when robots operate near people.
- Privacy and data: robots with cameras, microphones, or connected sensors may collect personal information that must be protected.
- Responsibility and fairness: clear rules are needed to decide who is accountable when a system causes harm and to reduce unfair outcomes.

Ethical research on robotics stresses that responsibility, privacy, autonomy, and the effects on human relationships should be considered during design and deployment, not only after problems occur (Wullenkord & Eyssel, 2020; UNESCO, 2017).

7. RECOMMENDATIONS

- Keep human supervision in high-impact settings such as healthcare and public services.
- Test robots for safety, reliability, accessibility, and potential bias before deployment.

- Protect personal data through clear policies, limited collection, and secure storage.
- Provide education and retraining so workers and students can develop relevant technical skills.
- Make the benefits of robotics accessible to different communities, including small organisations and people with disabilities.
- Create clear accountability rules for manufacturers, operators, and organisations using robots.

8. CONCLUSION

Robotics is changing the way society produces goods, delivers services, learns, and completes everyday tasks. Robots can improve precision, efficiency, and safety and can provide valuable assistance in healthcare, agriculture, education, and homes. At the same time, they raise important concerns about job transitions, cost, privacy, safety, fairness, and responsibility. Robotics should therefore be developed and used to support people rather than treating technology as a replacement for human judgement and care. With responsible design, appropriate oversight, and access to education, robotics can contribute positively to society.

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