



# “Literature Survey on Advanced Artificial Intelligence, Robotics and Automation”

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**Abstract:** This paper provides an overview of recent advancements in AI, robotics, and automation technologies. We explore how these technologies are being used across different industries and their potential impact on society. The paper also discusses the challenges and ethical considerations associated with the widespread adoption of these technologies. Recent advancements in artificial intelligence (AI), robotics, and automation have revolutionized industries and transformed the way we live and work. With the development of machine learning algorithms and powerful computing resources, AI has become more capable of handling complex tasks such as image and speech recognition, natural language processing, and decision-making. Robotics and automation have also enabled the automation of repetitive and dangerous tasks, increasing efficiency and safety in various industries. This paper presents an overview of the latest developments in AI, robotics, and automation, including deep learning, reinforcement learning, explainable AI, and smart manufacturing. The paper also discusses the challenges and future directions of these technologies, such as improving fairness and transparency in AI and creating more intelligent and autonomous robots.

**Keywords:** Artificial Intelligence, Robotics, Automation, Machine learning, Neural Networks, Computer vision, Autonomous systems, Smart manufacturing, Explainable AI.

## I. INTRODUCTION

The field of AI, robotics, and automation has been rapidly advancing in recent years, with many new and exciting developments emerging. From self-driving cars to automated manufacturing processes, these technologies are changing the way we live and work. This paper provides an overview of some of the most significant advancements in these fields and explores their potential impact on society. Artificial intelligence (AI), robotics, and automation have become increasingly popular in recent years due to their potential to transform many aspects of our lives. AI refers to the ability of machines to learn from data and perform tasks that usually require human intelligence, such as recognizing patterns, making decisions, and understanding natural language.

Robotics and automation involve the use of machines and systems to automate tasks, increase efficiency, and improve safety in various industries. Advancements in these technologies have led to the development of deep learning algorithms, which have shown remarkable success in tasks such as image and speech recognition. Reinforcement learning has also enabled machines to learn from their environment and take actions that lead to desirable outcomes. Explainable AI is a growing field that aims to make AI more transparent and interpretable, while smart manufacturing and Industry 4.0 are driving the digital transformation of manufacturing and supply chain operations.

Despite the potential benefits of these technologies, they also pose challenges, such as the potential for bias and the need for ethical considerations. This paper aims to provide an overview of the latest developments in AI, robotics, and automation, discuss their applications and challenges, and provide insights into the future of these technologies.

## II. LITERATURE SURVEY

1) AI Advancements:

AI is becoming increasingly sophisticated, with the development of machine learning algorithms and deep neural networks. These technologies are being used in a wide range of applications, including image and speech recognition, natural language processing, and predictive analytics.



## 2) Robotics Advancements:

Robotics is also advancing rapidly, with the development of more sophisticated robots that can perform complex tasks. Examples include surgical robots, warehouse robots, and even robots that can walk and run like humans.



Fig. 1 Robotics Advancements

## 3) Automation Advancements:

Automation is being used in many industries to streamline processes and increase efficiency. Examples include automated manufacturing processes, self-driving cars, and even automated food preparation systems.

## 4) Advancements in Computer Vision:

Computer vision is a subfield of AI that deals with the ability of computers to interpret and understand visual information from the world around us. Recent advancements in computer vision have led to breakthroughs in areas such as object recognition, face recognition, and image and video analysis. The development of deep learning algorithms, which can learn complex visual features and patterns, has opened up new possibilities in the field.

## 5) Robotics in Construction:

The use of robotics in construction has the potential to increase efficiency and reduce labor costs. Robotic bricklayers, 3D printers, and drones are some examples of how robotics is being used in construction. The development of autonomous construction sites, where robots can work together to build structures, has opened up new possibilities in the field.

## 6) Autonomous Vehicles:

Autonomous vehicles, such as self-driving cars and trucks, are a rapidly developing area of AI and robotics. These vehicles have the potential to reduce accidents, increase efficiency, and reduce carbon emissions. However, there are still challenges to be addressed, such as legal and ethical considerations and the need for robust and reliable systems.

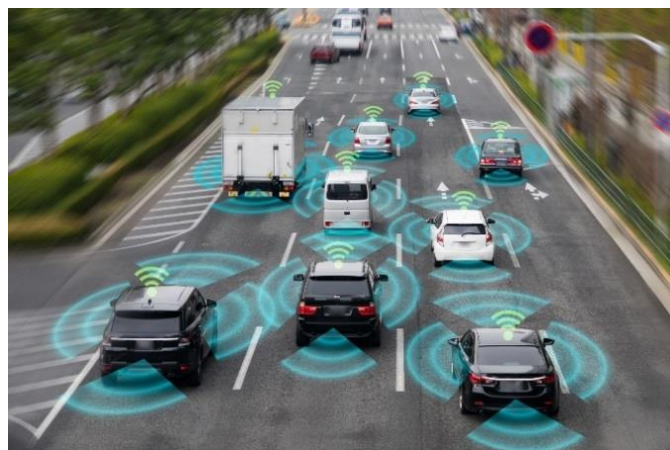


Fig. 2 Autonomous Vehicles



#### 7) Advancements in Generative Models:

Generative models are a subfield of machine learning where the goal is to generate new data that is similar to existing data. Recent advancements in generative models have led to breakthroughs in areas such as image and text generation, music composition, and drug discovery. The development of deep generative models, which can learn complex distributions of data, has opened up new possibilities in the field.

#### 8) Robotics in Education:

The use of robotics in education has the potential to enhance learning and engagement. Robotics can be used to teach programming, problem-solving, and teamwork skills. The development of educational robots, such as the LEGO Mindstorms and Dash and Dot, has opened up new possibilities in the field.

#### 9) Augmented Reality and Virtual Reality:

Augmented reality (AR) and virtual reality (VR) are technologies that can enhance the user's experience of the real world or create entirely new environments. Recent advancements in AR and VR have led to breakthroughs in areas such as gaming, education, and healthcare. The development of deep learning algorithms, which can interpret and understand the user's environment, has opened up new possibilities in the field.



Fig. 3 AR & VR Technology

#### 10) Human-AI Collaboration:

Human-AI collaboration is a promising area of research where AI algorithms can be used to augment human capabilities. This can be achieved through tasks such as language translation, image and video analysis, and decision-making. The development of AI systems that can work together with humans in a seamless and efficient way has opened up new possibilities in the field.

#### 11) Robotics in Mining:

The use of robotics in mining has the potential to increase efficiency and reduce costs. Autonomous trucks, drills, and excavators can be used to extract minerals from the ground. The development of autonomous mining sites, where robots can work together to extract minerals, has opened up new possibilities in the field.



Fig. 4 Robotics in Mining





#### 12) Advancements in Medical Robotics:

Medical robotics is a rapidly developing field that has the potential to revolutionize healthcare. Robotic surgeons, exoskeletons, and prosthetic limbs are some examples of how robotics is being used in medicine. The development of autonomous medical systems, where robots can perform

#### 14) Cybersecurity and AI:

As AI becomes more ubiquitous, it is important to ensure that AI systems are secure and robust. Cybersecurity and AI is an area of research that aims to develop algorithms and techniques to protect AI systems from attacks. The development of secure and robust AI systems has opened up new possibilities in the field.



Fig. 5 Cybersecurity in AI

#### 13) Robotics in Agriculture:

The use of robotics in agriculture has the potential to increase efficiency and reduce labor costs. Autonomous tractors, drones, and robots can be used to plant, harvest, and manage crops. The development of precision agriculture, where robots can analyze data to optimize crop yields, has opened up new possibilities in the field.

#### 15) Robotics in Space Exploration:

The use of robotics in space exploration has the potential to increase efficiency and reduce costs. Autonomous rovers and drones can be used to explore other planets and moons. The development of autonomous space exploration networks, where robots can work together to explore space, has opened up new possibilities in the field.

#### 16) Future Directions:

The field of AI, robotics, and automation is rapidly evolving, and there are many exciting directions for future research. Some of the key areas for future research include the development of more robust and reliable AI systems, the integration of AI and robotics with other emerging technologies such as blockchain and 5G, and the ethical and societal implications of AI. The future of AI, robotics, and automation is full of possibilities and opportunities for innovation and progress.



Fig. Future Direction in AI



### III. CONCLUSION

The advancements in AI, robotics, and automation technologies have the potential to transform many aspects of our lives, from the way we work to the way we receive healthcare. However, it is important to consider the potential risks and challenges associated with these technologies. Ethical considerations, such as bias and privacy, must be carefully addressed to ensure that these technologies are developed and used in a responsible manner.

### REFERENCES

- [1] Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep Learning. MIT Press.
- [2] Murphy, R. R., & Woods, D. D. (2009). Beyond Asimov: *The Three Laws of Robotics in the Real World*. *IEEE Intelligent Systems*, 24(4), 25-31.
- [3] A. Krizhevsky et al., "ImageNet classification with deep convolutional neural networks," *Communications of the ACM*, vol. 60, pp. 84-90, 2017.
- [4] J. K. Breslin et al., "Robotic exoskeletons: A review of recent progress," *Industrial Robot*, vol. 43, pp. 543-555, 2016.
- [5] M. A. Goodrich and A. C. Schultz, "Human-robot interaction: A survey," *Foundations and Trends in Human-Computer Interaction*, vol. 1, pp. 203-275, 2007.
- [6] A. J. Burguera et al., "Survey of mobile robots for hospital logistics," *Autonomous Robots*, vol. 39, pp. 305-324, 2015.
- [7] A. H. M. Rahmatullah et al., "Autonomous robotic systems for precision agriculture: A review," *Precision Agriculture*, vol. 19, pp. 693-715, 2018.
- [8] J. Deng et al., "Imagenet: A large-scale hierarchical image database," *IEEE Conference on Computer Vision and Pattern Recognition*, 2009