

## **ROBOTS WITH ARTIFICIAL INTELLIGENCE**

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**Abstract:**

*The advantages and disadvantages of robots with artificial intelligence are considered. Examples of potential risks while using robots are given as well as their opportunities and impact on our life.*

**Key words:** robots, artificial intelligence, evolution, success, technique, progress, robotics.

**Анотація**

*Розглянуто переваги та недоліки роботів з штучним інтелектом. Наводяться приклади потенційних ризиків при використанні роботів, а також їх можливості та вплив на наше життя.*

**Ключові слова:** роботи, штучний інтелект, еволюція, успіх, техніка, прогрес, робототехніка.

### **Introduction**

Artificial intelligence (AI) and robotics are two "overnight successes" that have been decades in the making, and their intersection will soon change a multitude of industries. The evolution of smarter AI and more-versatile robotics has helped both technologies to push past repetitive tasks to take on adaptive and more intelligent applications. Recently, we've gone from fairly basic AI to AI that can beat humans in sophisticated board games and make decisions we are not capable of.

In the coming years, the result will be nothing short of revolutionary paradigm shifts. The impending age of smarter robotics will certainly have a profound impact on traditional manufacturing; companies such as Microsoft and Oracle have already made huge strides in helping develop the cognitive, connected factory. At the same time, AI-infused robots will also begin to transform industries that haven't employed intelligent machines thus far. This will create interesting scenarios in areas of productivity, safety, service, transportation, companionship and even habitation [1].

From SIRI to self-driving cars, artificial intelligence (AI) is progressing rapidly. While science fiction often portrays AI as robots with human-like characteristics, AI can encompass anything from Google's search algorithms to IBM's Watson to autonomous weapons.

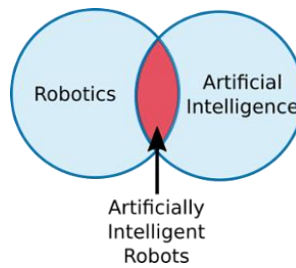
Artificial intelligence today is properly known as narrow AI (or weak AI), in that it is designed to perform a narrow task (e.g. only facial recognition or only internet searches or only driving a car). However, the long-term goal of many researchers is to create general AI (AGI or strong AI). While narrow AI may outperform humans at whatever its specific task is, like playing chess or solving equations, AGI would outperform humans at nearly every cognitive task.

### **Main part**

Robotics is a domain in artificial intelligence that deals with the study of creating intelligent and efficient robots. Robotics is a branch of AI, which is composed of Electrical Engineering, Mechanical Engineering, and Computer Science for designing, construction, and application of robots. Robots are the artificial agents acting in real world environment.

The first thing to clarify is that robotics and artificial intelligence are not the same thing at all. In fact, the two fields are almost entirely separate [2].

A Venn diagram of the two would look like this:



Difference in Robot System and Other AI Program

AI Programs	Robots
They usually operate in computer-stimulated worlds.	They operate in real physical world
The input to an AI program is in symbols and rules.	Inputs to robots is analog signal in the form of speech waveform or images
They need general purpose computers to operate on.	They need special hardware with sensors and effectors.

Robots are constructed with the following:

- Power Supply – The robots are powered by batteries, solar power, hydraulic, or pneumatic power sources.
- Actuators – They convert energy into movement.
- Electric motors (AC/DC) – They are required for rotational movement.
- Pneumatic Air Muscles – They contract almost 40% when air is sucked in them.
- Muscle Wires – They contract by 5% when electric current is passed through them.
- Piezo Motors and Ultrasonic Motors – Best for industrial robots.
- Sensors – They provide knowledge of real time information on the task environment. Robots are equipped with vision sensors to be to compute the depth in the environment. A tactile sensor imitates the mechanical properties of touch receptors of human fingertips [3].

Tasks of Computer Vision:

- OCR – In the domain of computers, Optical Character Reader, a software to convert scanned documents into editable text, which accompanies a scanner.
- Face Detection – Many state-of-the-art cameras come with this feature, which enables to read the face and take the picture of that perfect expression. It is used to let a user access the software on correct match.
- Object Recognition – They are installed in supermarkets, cameras, high-end cars such as BMW, GM, and Volvo.
- Estimating Position – It is estimating position of an object with respect to camera as in position of tumor in human's body [4].

Application Domains of Computer Vision: Agriculture, Autonomous vehicles, Biometrics, Character recognition, Forensics, security, and surveillance, Industrial quality inspection, Face recognition, Gesture analysis, Geoscience, Medical imagery, Pollution monitoring, Process control, Remote sensing, Robotics, Transport [5].

The robotics has been instrumental in the various domains such as:

- Industries – Robots are used for handling material, cutting, welding, color coating, drilling, polishing, etc.
- Military – Autonomous robots can reach inaccessible and hazardous zones during war. A robot named Daksh, developed by Defense Research and Development Organization (DRDO), is in function to destroy life-threatening objects safely.
- Medicine – The robots are capable of carrying out hundreds of clinical tests simultaneously, rehabilitating permanently disabled people, and performing complex surgeries such as brain tumors.
- Exploration – The robot rock climbers used for space exploration, underwater drones used for ocean exploration are to name a few.
- Entertainment – Disney’s engineers have created hundreds of robots for movie making [6].

To date, there are many different robots, the biggest news was Sophia - a robot with artificial intelligence, which became a citizen of Saudi Arabia. Sophia was made by Hanson Robotics, based in Hong Kong. Sophia is an evolving genius machine [7]. Her incredible human likeness, expressiveness, and remarkable story as an awakening robot over time makes her a fascinating front-page technology story, she even has a sense of humor. This AI robot once said it wanted to destroy humans.

Why demand for AI has arisen just now:

1. Today we are dealing with an unprecedented amount of information. Over the past few years, 90% of global data has been created. For the first time, these statistics are mentioned in a study by IBM Corporation in 2013, but this trend remains constant. Indeed, every two years over the past three decades, the amount of data in the world is increasing by about 10 times.
  2. Algorithms are becoming more sophisticated, and machines with neural networks can reproduce the way of working the human brain and form complex associations.
  3. The computing power is constantly increasing, and it can process a huge amount of data.
- Bring it together and get a lot of technical staff, company executives and venture capitalists who invest in AI development and are interested in technology advancement [8].

Robots are not going to replace humans, they are going to make their jobs much more humane. Difficult, demeaning, demanding, dangerous, dull – these are the jobs robots will be taking. Productivity is one of the primary benefits of robotics in the workplace. In Europe, the goal is to attain a 20 percent increase in productivity by 2020. Central to achieving this is the exploration and use of robotics in the workplace [9].

Understanding the reason why robots are being used in industry is a good place to start. Improving productivity levels is a priority for all organizations. Efficiency gains are driving the use of robotics in industrial environments, factories, routine service environments and manufacturing plants. Using robotics in industrial settings improves productivity [6].

In most instances, an increase in productivity leads to an increase in potential jobs being created within a company – either to fulfil new roles and tasks required to train and manage a robotic process, or, freeing up resource to deliver services or tasks which require a different level of human interaction. When it comes to assessing the long term economic impact of robotics adoption and use, the data is not yet reliable, it’s just now being created [9].

Engineers need to ensure that the AI they create has the ability to learn, discern bias, and avoid making the same mistakes prior to replacing traditionally human-held positions in the workforce

and in society, in general. Ultimately, society's responsibility is not to make AI more human-like, but to make AI that significantly improves human lives [10].

There are a lot of opinions about such robots. Artificial intelligence is beginning to transform society, from babysitting children to self-driving cars.

But, many scientists, including Professor Stephen Hawking, argue it may only be a matter of time before they gain consciousness and destroy mankind like something out of science fiction.

Professor Hawking said: "The development of full artificial intelligence could spell the end of the human race." Robots could soon be weaponised and some people have advocated the advancement, arguing it could save lives.

But, a report by Human Rights Watch and the Harvard Law School International Human Rights Clinic has called for humans to remain in control of weapons at a time of rapid advancement.

Senior arms division researcher at Human Rights Watch, Bonnie Docherty, said: "Machines have long served as instruments of war, but historically humans have directed how they are used."

"Now there is a real threat that humans would relinquish their control and delegate life-and-death decisions to machines." [11]

"Robots will replace people?" - this question is increasingly beginning to sound in developed countries, where the automation of certain systems are almost at the first place on the road to an innovative and technological breakthrough.

### **And where will a person remain irreplaceable?**

Psychology, music, art, singing - in all of this, human has no equal. In professions where you need imagination, creativity, a people will remain at the helm. And if robots replace a person in many ways, many can easily find themselves in these spheres without problems.

Certainly, the work of the analysts will remain. After all, robotic technology will definitely belong to companies, which means that the stock, commodity and raw materials markets will remain fully functional. True, it will be necessary to rebuild the consciousness somewhat, since oil and currency can drastically change the price trend. After all, if robots replace people, the balance of supply and demand will change, which will affect the currency quotes. And oil will gradually be replaced by electricity, for example, based on hydrogen technologies and solar batteries.

According to the "Financial Times", the least likely to be left without a job is surgeons, dentists, and, in general, all those who work in the social and healthcare spheres. And if robots replace people, then more and more demand will be in professional programmers and employees with technical knowledge. Also, this trend will contribute to the development of small businesses based on new types of services related to the replacement of human functions [12].

Scientists believe research today will help us better prepare for and prevent such potentially negative consequences in the future, thus enjoying the benefits of AI while avoiding pitfalls.

In the near term, the goal of keeping AI's impact on society beneficial motivates research in many areas, from economics and law to technical topics such as verification, validity, security and control. Whereas it may be little more than a minor nuisance if your laptop crashes or gets hacked, it becomes all the more important that an AI system does what you want it to do if it controls your car, your airplane, your pacemaker, your automated trading system or your power grid. Another short-term challenge is preventing a devastating arms race in lethal autonomous weapons.

In the long term, an important question is what will happen if the quest for strong AI succeeds and an AI system becomes better than humans at all cognitive tasks. As pointed out by I.J. Good in 1965, designing smarter AI systems is itself a cognitive task. Such a system could potentially undergo recursive self-improvement, triggering an intelligence explosion leaving human intellect far behind. By inventing revolutionary new technologies, such a superintelligence might help us eradicate war, disease, and poverty, and so the creation of strong AI might be the biggest event in human history. Some experts have expressed concern, though, that it might also be the last, unless we learn to align the goals of the AI with ours before it becomes superintelligent [13].

## Conclusion

As you can see, robotics and artificial intelligence are really two separate things. Robotics involves building robots whereas AI involves programming intelligence. After analyzing the characteristics and capabilities of robots with artificial intelligence, we can say that there are certain advantages and disadvantages. The biggest drawback is that this area is poorly understood. Also, with the advent of such robots, many people can be unemployed. Speaking about the benefits, it should be emphasized that it is possible to simplify human life, in some cases to prevent a life threatening.

Speaking from a scientific point of view, this is a big step in the future, innovations that will be useful in everyday life.

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