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AI Robotics Technology: A Review

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Artificial intelligence (AI) has changed the course of our lives in many ways, both professionally and personally. Soon, autonomous systems will be integral to a wide variety of fields, including space, marine, and aviation robotics, field, and road robotics, and service robots. However, automated systems not only do routine tasks but also significantly improve the quality of the labor force. Artificial intelligence and robotics have advanced to the point that it's possible to build a computer with awareness, sentience, and the ability to think. Innovative research into combining AI with robots is yielding many exciting prospects for the future of technology. The process of compiling these potentials has begun. Abbreviating "robotic process automation" to "RPA" helps keep things simple. backed by tools that facilitate a new kind of Bioinformatic process automation (BPA) in the business world something which is based on software, such as artificial intelligence (AI) or robots. employees of a society or organization.

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1. INTRODUCTION

In the minds of those who have never heard the phrase "Robotic Process Automation," images of shiny robots flying on sailplanes may immediately come to mind. This is a natural mental link that many people make. During the previous decade, there has been a significant improvement in the complexity of robot technology. These days, autonomous robot systems may function for weeks, months, or even years at a time in increasingly more complex circumstances. Because of this, we can finally do this [1]. The first part deals with the prerequisites that must be satisfied to run the program. Consider the environment, the tasks at hand, and the hardware and software available to the robot while designing its platform's. Automation helps improve manufacturing quality in numerous ways, but one is by allowing for precise repetition that was previously impossible when depending on human labor. Automation improves production quality in a wide variety of ways, and this is only one of them. Recent advances in information technology, together with the introduction of artificial intelligence and robotics-powered robots, have had a considerable impact on the global workplace. In both wealthy and developing nations, this is the case [2]. Quite a few nations have established programs specifically designed to further AI and robotics study at the national level [3]. These strategies, which include a wide range of options for overseeing the comprehensive use of these technologies, are ready to be put into action. With the help of IoT technology, users will soon be able to turn ordinary objects into internet-connected smart devices. The gadgets will be able to communicate with one another and share data thanks to this online link [4]. This means that the concept of artificial intelligence and robot rights imposes an equal level of responsibility and obligation on human civilization. Applying AI to robotics primarily focuses on enhancing the practicality of the many several types of industrial robots. Due to the immaturity of the field of study which is cooperative autonomous mobile robots, no one subfield within this area can be said to have reached its full potential at this time [5].

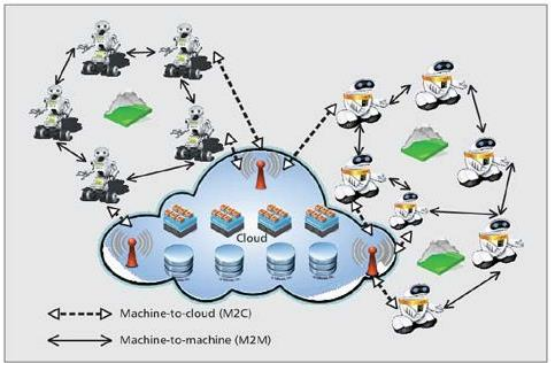


Fig. 1. Cloud robotics

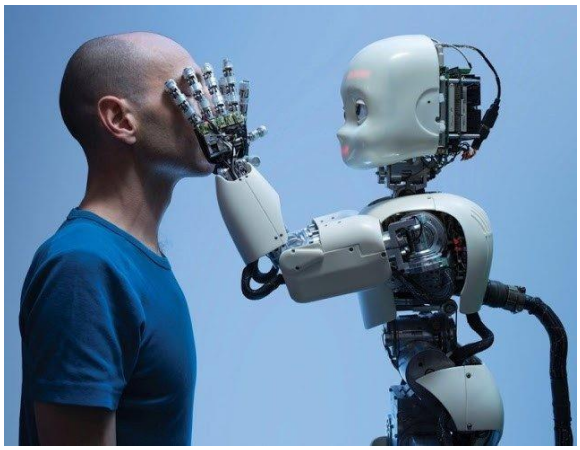


Fig. 2. Ai Robotics technology

I. AI AND ROBOTICS

To exemplify this kind of process, consider the manufacturing procedure, which is a fantastic example of a stochastic process in its most fundamental form. To accomplish tasks on work components of varying shapes and sizes, an operator needs not only his hands but also his senses and his mind [6]. This class includes actions including grasping, holding, orienting, inserting, aligning, fitting, screwing, and rotating. Some activities that may be categorized here are holding, grasping, rotating, and screwing [7]. In all likelihood, all this is a piece of software with the potential to be converted into a program capable of carrying out the kinds of administrative tasks that would typically need the involvement of a live, breathing human being [8]. This may be only a piece of code with the makings of a program that can carry out these tasks. That's right; it's possible we're not dealing with a computer at all. Most operations teams

that have used RPA have successfully reassured their staff that they would not lose their employment as a consequence of the technology's introduction [9]. This measure has been made to increase support for RPA deployment. Plants with medium to low output capacity often use programmable automation in their assembly lines. As the number of use cases where robots might be useful keeps growing, programmable automation is getting its share of this movement [10]. Numerous works of the period employed cameras as the robots' primary sensing device to better enable them to perceive their surroundings. Many different stories included these robots. Due to this cause, a great deal of development has occurred in this sector. To achieve the same level of precision as a human, a robot must interact with its surroundings in the same way a human would. That being said, for a robot to successfully imitate human characteristics, it has to demonstrate some degree of intelligence [11]. In addition to sensors and adaptive control components maintained by a computer, a robot is called intelligent if it maintains a functional arm and end-effectors [12]. A smart robot will, in other words, have a functional arm equipped with end-effectors. We call robots with this capability "surviving arms and end-effectors." This need to adjust to new conditions is known as the requirement to handle an open environment around artificial intelligence (AI). The robot may need to adjust to new tools, techniques, or information as they become available, or the user may alter the tasks or how the robot should do them. It's feasible to imagine both outcomes. These two scenarios deserve equal consideration. At this moment, one of these two outcomes is plausible. Adaptive control is used to repair the mistakes that have occurred in the location and orientation of the workpieces and the end-effectors. This is because mistakes have already been made [13]. These flaws have their origins in a mismatch that happened somewhere during manufacture. If a robot is to be considered intelligent, it must be able to distinguish apart the root causes of an event from the changes brought about by those causes. Because of this, it should be able to identify problems and lessen the amount of disturbance they create. An external device, sometimes physically attached to the robots, is used to command their actions. Sometimes it's the robots themselves operating the machinery. The operations of this controller are directed by a second device, also serving as a controller, but located elsewhere in the system. In this hypothetical future, an artificial intelligence system, rather than a real individual, performs mental tasks, such as brain function [14]. Many diverse types of physical work may benefit from using the fundamental concepts and axioms of computer science. Sense-making and exerting influence are only two of the many activities that fall under this umbrella. All of these are tasks that the body must do. This illustrates that these technologies have considerably more extensive applications within the sectors than just automating routine administrative activities [15]. A person's mental and physical processes must be in sync for them to fulfill the obligations associated with their profession.

Because of this, it follows that for a computer to be considered intelligent, it must exhibit behavior characteristic of artificial intelligence.

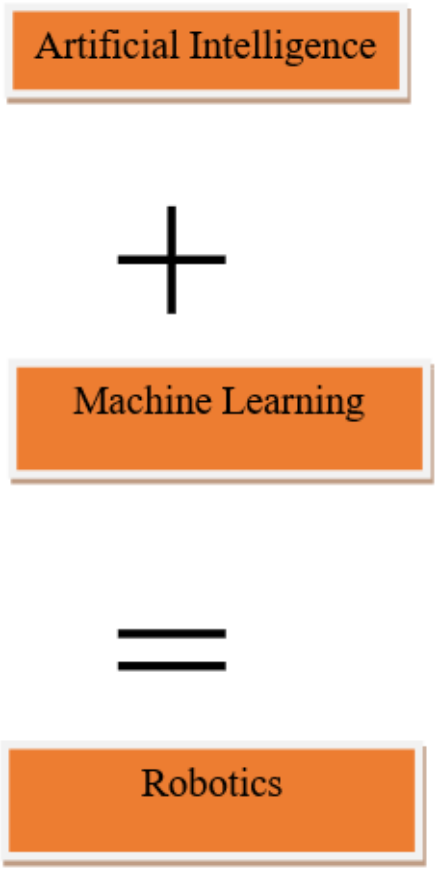
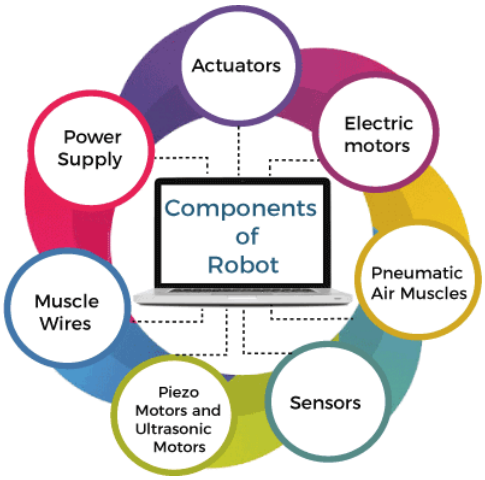


Chart 1. Approach in robotics

II. COMPONENTS OF ROBOT

A machine that has the appearance of a human being and is capable of executing acts that are out of the ordinary and automatically mimicking specific human motions in response to orders

provided to it via the use of programming is known as a robot [16].



Picture 1. Components of Robot

A. Actuators

Actuators are devices responsible for regulating and moving a system or piece of equipment [17]. It is common practice to use the words "actuators" and "controllers" interchangeably. This is made possible by the several energy conversions it performs, including those between electrical, hydraulic, and air. Actuators may provide linear motion in addition to their rotary capabilities.

B. Power supply and electric motor

It is a piece of specialized machinery whose primary function is to provide power to other electrical devices. The primary role of the power source is to provide the load with the necessary power by switching the direction of the electrical current. These components are required for the machines to turn because they convert electrical energy into mechanical energy. They are crucial for the devices to function properly [18].

C. Pneumatic Air Mucles and Muscle Wires

Robotics may make excellent use of air muscles because of their adaptability and flexibility [19]. They can change their size by expanding and contracting because they include a pneumatic bladder that is filled with pressurized air. The volume of the air may be lowered by as much as forty percent when it is pumped. Nitinol is a kind of nickel- titanium alloy that is used in the production of these, which have a form that is very flat and very thin. Depending on the quantity of heat and energy that is introduced into it, it might either expand or shrink. In addition, when it is in the martensitic phase, it may be manipulated into a wide variety of distinct forms. When exposed to an electrical current, they can undergo a 5% reduction in size.

D. Piezo Motors and Altrasonic motors

Piezometers are an electronic device type that uses an electrical signal to exert a focused force on a ceramic plate. The signal is received by the piezoelectric material used to build the piezo motor. These machines are also known as piezo motors. It allows a robot to follow the path that was predetermined for it. The electric motors used here perform well in the context of industrial robots.

E. Sensor

It uses them to experience sight, sound, and touch, just as a human being would. To better understand our surrounding world, sensors monitor it and send the gathered information to a central computer. Extra electrical parts are included in most of these gadgets. The electrical sensor is a vital part of both AI and robotics, analogous to the human body's organs. Real-time perception is possible for robots operating under the guidance of artificial intelligence algorithms, and the data they gather may be processed by computers.

2. ADVANTAGES

Robotic process automation has advanced to the point where software and related services can execute applications just as well as a human operator.

a rules-based system that allows complex tasks to be executed in an automated manner. Robots often serve as the physical embodiment of a newly discovered technology.

Artificial intelligence and the Internet of Things are both driving innovation, which is increasing the rate of change.

Designers will need to draw on their ingenuity, wit, and humility to successfully navigate the disruption that the technological revolution will cause to business processes and digital infrastructure. As a matter of practicality, the pre-existing responsibilities and obligations of human society may assist the performance of tasks by

artificial intelligence and robots, given that this is the domain in which they must exist to continue existing. This is because their continued existence depends on their ability to function in this environment. Artificial intelligence robots can process and evaluate vast amounts of data in a fraction of the time it would take a human analyst. They're able to do far more in a day because of their talent. Better and more well-informed decisions may be made by corporate executives thanks to increased bandwidth for in-depth study. The company will benefit from these choices. The problem of communication among multi-robot teams has received a lot of interest since the beginning of research on distributed robotics [20]. This is because, in a distributed robotics system, communication is crucial. This approach also requires precise demand forecasts and enhanced decision- making skills via the use of structured scenario analysis. When complex processes like these can be automated, as they can be with robotic process automation (RPA), significant productivity gains are possible. Knowledge workers will soon have greater leeway to apply their expertise to crucial causes. These causes are critical to the continued innovation and growth of the economy. They will be given this leeway so that they may put their skills and knowledge to use in furthering critical projects [21].

3. DISADVANTAGES

A company's inability to invest in robotic process automation (RPA) is commonly stated as a reason for its choice not to use RPA when analyzing the elements involved in making this decision. Many factors should be considered before making this decision. A sizeable section of our group holds that idea in extremely high esteem since their perspectives are highly congruent with it. In conclusion, it is reasonable to assume that the following objectives can only be met via the deployment of automated robotic process systems: The user must have a deep understanding of the many technological challenges that may arise [22]. A person's predisposition to delve too deeply into a topic might hold them back from reaching their full potential and cause them to lose out on chances. They could have a challenging time getting beyond that obstacle. Each one of the privileges to which they are entitled is made accessible to them. They are eligible for a wide range of privileges. Doping is a viable alternative that might be used to reach the goal of meeting the requirements.

Change, but if you use the right instrument, the impact might be magnified. change, but the effects might be magnified. change, but in other contexts, the effect may be far more pronounced. change, however, the effect may become much more prominent as the operation progresses. This change is less dramatic than the ones that came before it because the prior ones were more dramatic and disruptive. Then many people realize, especially when they first begin to consider the topic. Especially in the first stages of consideration. Most notably when it is being considered for the first time.

All these people have a second irrational concern: a phobia of public speaking. The widespread fear that robots will one day perform the labor that humans do in the future is a major factor in their aversion to RPA. This apprehension is a major factor in the RPA's resistance. Human workers should be substituted, and human laborers should be replaced with replacements for human employees when the main goal is to achieve the substitution of human laborers with substitutes for human employees. As part of any strategy with any real importance. Direct or indirect, most of these companies make use of machine learning in conjunction with some facet of their operations, and sectors, and it's undeniable that it's a key part of the enabling technology the LTA makes available.

4. AI AND ITS FUTURE CHALLENGES

Throughout this study, we looked at the problems associated with LTA in a variety of AI-related domains and the need for system-level integration to realize AI's full potential. We looked at the feasibility of LTA's prospective uses in behavioral prediction and modeling. There is a high probability that additional buyers of this product will provide feedback that is consistent with this example. LTA systems are crucial for reaching this objective, and constant update to their data sets are required for optimal performance. This is true regardless of whether the newly gathered data is reliable or agrees with the results of previous research conducted in other parts of the globe. It is also a truth that representations must meet several requirements to be useful. A semantic construct is any abstract notion that can be traced back to how people think about a certain subject. The phrase "knowledge transfer" is used to describe how LTA systems agree on which pieces of information about the external environment

should be shared. LTA networks engage in this deliberation process with one another. This process is implemented in several LTA networks. Artificial intelligence (AI), automation, and robots are all on the rise, and this is resulting in the introduction of innovative goods at the forefront of the electronics and technology sectors. Both society and the economy might be radically altered by the availability of these products. With the rise of voice-activated gadgets, it's only natural that we would begin to interact with them in this way. Computers are becoming increasingly integrated into and central to people's everyday lives because of advancements in user interfaces, increased network speeds, and the proliferation of mobile applications. Now occurring situations. Robots often serve as the physical embodiment of a newly discovered technology. Artificial intelligence and the Internet of Things are both driving innovation, which is increasing the rate of change. It is allowing for the creation of a vast quantity of latest items with intrinsic value. Distinct types of mechanical devices can communicate with one another. They are starting the ball rolling on the path to better human-robot interactions. Even though individuals make a difference, A future where detectors can connect with other mechanical artifacts might usher in a new era of global communication. Modern robots have self-learning capabilities; therefore, machines might do these tasks without any human guidance. Once you have a firm grasp of the situation, evaluate your options. In addition to acting autonomously, they will also reap the benefits of previous choices as well as maybe the cooperation of several additional gadgets [23]. It's hard to tell which came first, the revolution in business practices or the growth in the variety of ways in which individuals might earn a livelihood. the characteristics of a financial system in which all transactions take place digitally. The process of globalization has progressed to a point where it is felt everywhere, and there has been a rise in interest in studying its effects. Unpaid workers in the sharing economy are independent contractors. The increasing value of automated procedures and the benefits they provide Changes in the restaurant, manufacturing, and warehousing industries, as well as technology, are influencing how managers carry out their duties. run their enterprises. The speed of change is increasing, the quality of communication is rising, and Regular stores eventually stopped operating. Thanks to recent developments in computing power, robots can already mimic human levels of intellect. variation in output of the highest order. Machines may be controlled without human intervention if operators have access to appropriate remotes. Water quality is monitored automatically by sensors, which give alerts if problems are found. Tracking sensors installed in vehicles may be able to determine if a motorist has crossed over into oncoming traffic and take corrective action promptly. When computers are granted this level of independence, they can transition from a reactive to a proactive role, and robotic devices are placed in a position of leadership. decisions that were made by someone with greater influence. Successfully managing the current transformation in business practices and digital environments calls for the capacity to think creatively, be innovative, and have a humble mindset. abilities as designers to take on the problems created by the rapid pace of technological change and its repercussions. It's expected that computers will evolve rapidly over the following several years, having a major impact on society at large via the medium of popular culture, business, and politics. If done well, this shift has the potential to bring in a golden era marked by more global stability, greater affluence, and more chances for leisure. Despite this, unstable, damaging, and otherwise unreal works of fiction may be brought into actuality in the real world via poor decision-making.

5. CONCLUSION

The public sector is now in the process of developing many different intelligent gadgets for security monitoring and failure detection of sensitive systems such as nuclear reactors. The development of artificial intelligence (AI), robotics, and other forms of automation, along with other forms of automation, is accelerating at a fast pace, providing significant advantages to businesses in terms of performance and efficiency. These days, robotics are very advanced technologies since they span such a broad range of ideas, vocabularies, and implementations of technology. The capacity of managing data has advanced to a higher degree because of the revolution in information and communication technologies, which has taken the shape of a progression from basic computing machines to smartphones, from portable devices to wearables, and from the cloud to the Internet of Things. Attention must be paid to the moral obligations and duties that are incumbent upon artificial intelligence and robotics for this area to go to the next discernible stage of development.

Although there were just a few uses of AI at the time Across a range of industries, technology has had a significant effect industry that related to robots.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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