

IT Technologies

Robotics

What does it do?

Robotic technologies also known as mechatronics is the combination of Artificial Intelligence and mechanics to create autonomous machines that can fulfill a role or specific sub-function. A robot is defined as being an intelligent, physically embodied machine capable of performing tasks autonomously to some degree while also being able to sense and manipulate its environment. (Simon, 2020)

Our use of robots in society has become widespread amongst many facets of industry, manufacturing, agriculture, commercial enterprise, in the home, and even in space exploration. (Dimock, 2020) (NASA, 2022) (Rawat, 2022) For example modern car manufacturing production lines (Simon, 2020) utilize robotic arms for lifting, drilling cutting, welding as well as assembly. In addition to this CNC machines have allowed for the mass production of components greatly improving the speed at which manufacturing takes place.

The automotive industry has also made advancements in vehicle safety with the use of robotics. It has achieved this by utilizing systems such as ABS (Anti-Lock Braking Systems) which detects when the wheels are turning faster and adjusts the rate of braking along with other systems such as lane assist and collision detection and airbags. Future technology is also moving towards self-driving cars, which take away the human error with the goal of making roads safer and less congested. (Dimock, 2020)

In the home robotic technologies have been developed to assist with everyday domestic tasks such as Roombas, baby monitors, smart wiring and Intelligent washing machines which can detect how much water is needed for a given load and then send you a SMS alert when it's time to change the load. As well as host of other recreational devices. (Dimock, 2020)

Many advancements in robotics have been made in the field of space exploration since its inception in 1958, (whyweexplore) one of which is NASA's (North Atlantic Space Association) Curiosity A Rover which is capable of autonomous movement, operation as it collects samples and data and analyses the raw material as data to send back to earth for scientists for further analyses.

Robots such as the humanoid-like Sophia, have also been developed, that can learn from and adapt from interactions with people. (Dimock, 2020) Sophia is capable of operating like how a human would function, with her ability to control a working mouth and limbs by sending power to various motors in her body mimicking a human nervous system. The robotics company SynTouch (Simon, 2020) has also made major developments in the field by creating robotic fingers for prosthetics and robots like Sophia. These fingers can detect a range of sensations from temperature to

coarseness. This development adds a new dimension to how robots can interact with the wider world and improves the quality of life for those using robotic prosthetics. These prosthetics have also undergone developments to utilize sensors attached to muscles in the arm to allow the wearer of the prosthetic to be able to move the fingers like a second hand improving the quality of life for those with prosthetics. (Dimock, April 2020)

One amazing development being made in the robotics domain is the introduction of the Consis Robotic Cabinet (Rus, 2022), an automated shelf in pharmacies that can stock and dispense products. Robots like this can automate the shelf stocking of supermarkets down the line and fully automate the shopping experience.

Future and near future advancements in robotics technology will allow for hardware to be miniaturized, improving affordability and accessibility to a broader market.

Modularization would allow for engineers to create self-contained components compatible with a standard framework, allowing customization to meet the specific needs of the owner. Autonomous Devices describe robots that can examine their environment and making changes on the fly to be able to adapt and regulate themselves to maintain peak performance. (ECPI University, 2022)

To summarize, robotics has been utilized to advance most aspects of society. It has potential to improve the automation, efficiency, and safety in most sectors. Robots are also designed with human senses in mind. Robotic technology is the automation of previously impossible, dangerous, or mundane tasks, with the goal to create a more efficient and practical society. The technology used also helps to raise the quality of life in households by making mundane tasks more efficient and speed the production and expansion of industries. The technology also enables scientific fields to spread beyond the scope of what is currently possible.

What is the likely impact?

The primary impact of advancements in the field of robotics is efficiency through automation. Robotics can allow society to do more things with far less effort and time. Robots have the potential to increase efficiency in building sites and manufacturing facilities. Replacing labor intensive projects with automated systems using robotics, increasing output, and reducing risk. This improves safety for workers by reducing manual handling and risks associated with accessing dangerous environments. Overall, replacing humans with robots and robotics in high-risk scenarios will significantly improve safety outcomes in these industries (DJ Wardynski, 2020).

The impacts of robotics on the field of science and discovery, allows scientists to explore previously inaccessible locations such as the deep ocean and outer space where environmental conditions prevent traditional methods of exploration. (Peter, 2013)

Robotics, in general, can also meaningfully improve day-to-day life, with a broad range of tasks being completed by devices designed specifically for the application. These

tasks may be highly complex, with self-driving cars an example of a complex and dynamic. These advancements can drastically improve the general quality of life for society by reducing the time spent on menial tasks, allowing for greater productivity and additional recreation time.

However, there is a major moral dilemma associated with robotics and the automation of our future. There is a potential for a robot to make decisions based on its programming that can lead to highly unethical or even potentially fatal decisions. This development is doubly problematic when it's considered that the logic is often cold and not influenced by other more human factors such as empathy and human emotion. The risk of this issue is compounded when using robotics in warfare, specifically robotics coupled with artificial intelligence. In the battlespace decisions need to be made quickly, with rapid acquisition of new information there is a potential for cold logic to make catastrophic choices given that it is unable to take context or nuance into consideration this could lead to the mass loss of human life. (DJ Wardynski, 2020) (Kenna Castleberry, 2021)

Another major moral dilemma concerns the usage of robots in low-skill jobs. Such as manufacturing plants and mines. These fields are in demand and dangerous for people to work in. The reduction of these jobs in these fields increases the necessity for higher education. For members of society to find adequately paying jobs in an era where the cost of living is being raised, where education, overall, is gatekept by opportunity and/or monetary cost to the potential student. The impact of the automation and loss of jobs such as these could lead to a greater amount of people living in poverty. (DJ Wardynski, 2020) (Kenna Castleberry, 2021)

In conclusion, the advancements in robotics will lead to a safer and possibly more efficient society, one where we would also need to take on a greater range of challenges associated with the social and moral implications of the rapid integration of robotic technologies in our daily lives.

What will the impact be on daily life for you and your family?

The field of robotics would greatly improve the quality of life in many impactful ways. Developments in devices capable of completing household and other domestic tasks will free up the time available for families to reconnect and participate in recreational activities. The impact on my career from the development and refining of robotics will have an ever-increasing influence, my current career path and my future career planning. Although robotics can perform the function of making your coffee, they lack the ability to have the human connection which I have with my customers.

One specific example is self-driving cars which will impact commuting, as outsourcing the control of the car will allow me to use the time more productively. Developments in autonomous vehicles will remove limitations on who can operate them, providing greater accessibility for the young, old and others who currently have limited access to personal transportation.

With the advancement of robotics ideally more of my time would be freed up to spend with my family and friends. Replacing roles which are undesirable to the human workforce and increasing the available resources in areas where human intuition is required. This leads me to believe that as a society we need to consider what aspects of our culture and civilization we are willing to automate, and how to protect those displaced by robotic innovations.

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