



## History of Robots

The notion of robots or robot-like automates can be traced back to medieval times. Although people of that era didn't have a term to describe what we would eventually call a robot they were nevertheless imagining mechanisms that could perform human-like tasks.



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In medieval times, automatons, human-like figures run by hidden mechanisms, were used to impress peasant worshippers in church into believing in a higher power.

The automatons, like the clock jack pictured here, created the illusion of self-motion (moving without assistance). The clock jack was a mechanical figure that could strike time on a bell with its axe. This technology was virtually unheard of in the 13th century. So imagine how awe-inspiring an automaton was to someone just like you!

In the 18th century, miniature automatons became popular as toys for the very rich. They were made to look and move like humans or small animals.

The pretty musician in the picture was built around 1890. She can turn her head from side to side while playing the instrument with her hands and keeping time with her foot.





In literature, humankind's vivid imagination has often reflected our fascination with the idea of creating artificial life.

In 1818, Mary Shelly wrote *Frankenstein*, a story about the construction of a human-like creature. For Shelly, a robot looked like man but had the ability to function like a machine. It was built of human components, which could be held together by nuts and bolts. Notice there are even clips to hold the top of the head together! Shelly considered that a robot had to be bigger than a regular person and had to have super human strength.



In 1921, Karel Capek, a Czech playwright, came up with an intelligent, artificially created person, which he called "robot". The word "robot" is Czech for worker, and was gradually incorporated into the English language without being translated. As you can see, even a hundred years after Shelly's *Frankenstein*, Capek's idea of a robot is still one in which the creation resembles the human form. You can see in the picture that the robot looks much more rigid and machine-like than the woman standing next to it.



While the concept of a robot has been around for a very long time, it wasn't until the 1940's that the modern day robot was born, with the arrival of computers.



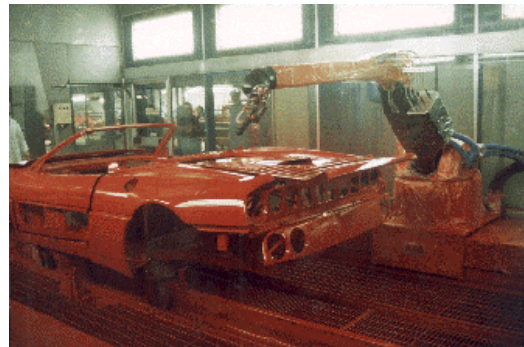
The term robotics refers to the study and use of robots; it came about in 1941 and was first adopted by Isaac Asimov, a scientist and writer. It was Asimov who also proposed the following “Laws of Robotics” in his short story *Runaround*:

**One**, a robot may not injure a human being or through inaction, allow a human being to come to harm. ...  
**Two**, (...) a robot must obey the orders given it by human beings except where such orders would conflict with the First Law. ...  
**Three**, a robot must protect its own existence as long as such protection does not conflict with the First or Second Laws.

Isaac Asimov<sup>i</sup>

The robot really became a popular concept during the late 1950’s and early 1960’s. With the automotive industry in full expansion at that time, industrial robots were employed to help factory operators.

Industrial robots do not have the imaginative, human-like appearance that we have been dreaming of throughout the ages. They are computer-controlled manipulators, like arms and hands, which can weld or spray paint cars as they roll down an assembly line.



In fact, industrial robots are so unlike the conception of robots held in the past that you might not even recognise one.

Did you know that one of the first operational, industrial robots in North America appeared in the early 1960’s in a candy factory in Kitchener, Ontario?

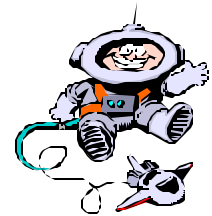




A robot can go where humans cannot. In fact, robots were created to help humans, especially in high risk or dangerous situations. A robot can deactivate a bomb, go to the edges of an active volcano, transport dangerous materials, explore the ocean floor and even perform tasks in the most hostile environment known to man: space.

So why is space such a hostile environment? First of all, in space there is no oxygen, and temperatures can range from 120 degrees Celsius in the sun and -100 degrees in the dark, when the Earth blocks the sun. Without the proper protection, like a spacecraft or even the EVA suit used by space walkers, survival in space is not possible.

When repairs have to be made outside a spacecraft, astronauts are sometimes required to leave the space shuttle or the Space Station. These extravehicular activities are very dangerous, therefore, robots are used to carry out tasks in space in order to limit the number of extravehicular activities undertaken.



What does a space robot look like? As we have discovered, today's robots do not necessarily resemble humans. A human is made up of a number of different visible components, like a head - where the brain sends messages to the rest of the body; arms and hands to grasp and manoeuvre objects; a torso to which all of the components are attached and legs to move. Oh! And don't forget the ears, eyes, and mouth to hear see and communicate! Robots need all these different components to operate.



A number of robots make up the Mobile Servicing System. The Mobile Servicing System is Canada's contribution to the International Space Station. Canada created the Mobile Servicing System to help in the construction of the Space Station; it will first build the Space Station and then help maintain the Station throughout its lifetime.



Just like humans have a brain that sends messages to the rest of the body; there is a main computer that communicates with the robotic system.

The Space Station Remote Manipulator System (SSRMS), Canada's new robotic arm, will be able to lift and move objects the size and mass of the Space Shuttle. The crew of STS-100 with Canadian Space Agency Astronaut Chris Hadfield will deliver and install the new arm to the International Space Station as it orbits high above the Earth. This second generation Canadarm is Canada's primary contribution to the Station.



The Space Vision System (CSVS), another critical piece of Canadian robotics innovation, is comprised of several cameras and targets. These are located in key areas of the Space Station and on the robotic arm; it will serve to pinpoint the exact movement and location of components for the building and maintenance of the Station. So, astronauts from inside the Space Station are able to operate the Mobile Servicing System by using this Space Vision System.

Aside from the CSVS, the next Canadian robot to be brought to space is the SSRMS. When it is brought to space to be installed to the Space Station during STS-100, its predecessor, the Canadarm will lift it from the payload (the inside) of Space Shuttle *Endeavour* and bring it to the International Space Station. This will be the first in a series of handshakes in space performed by these robots.

Stay tuned for more exciting facts about robots...

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<sup>i</sup> Asimov, Isaac: *I, Robot*. Doubleday & Company, Inc.; New York; 1950; p51