



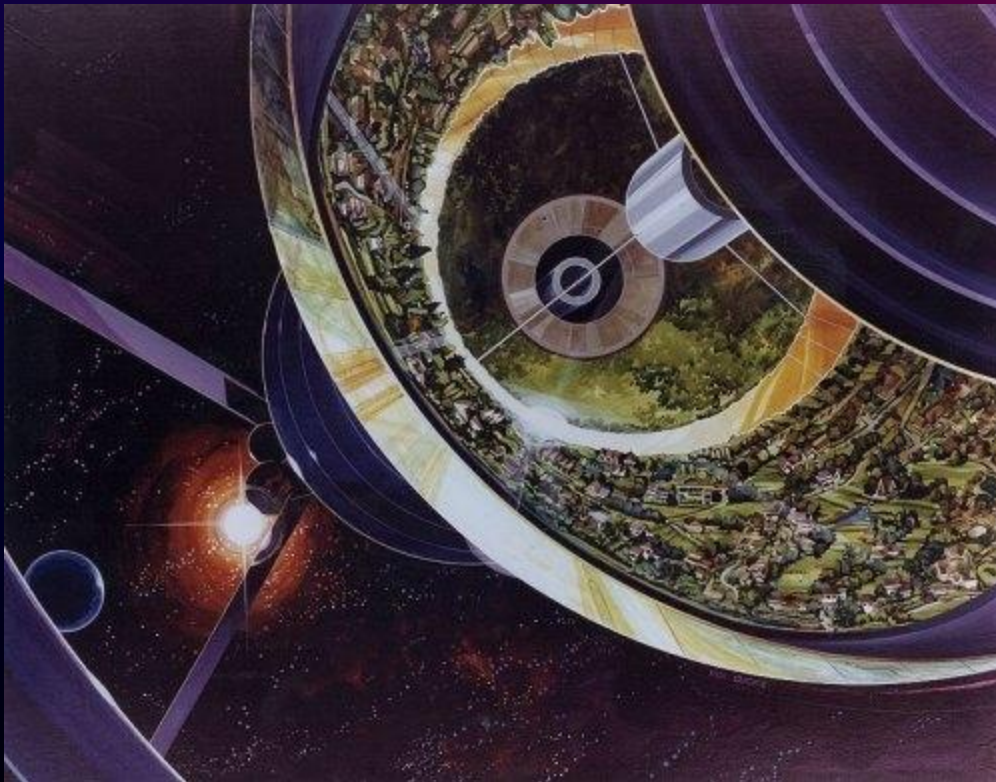
Presentation on Robotics

Robotics in Space

Robotics


Robotics is the branch of technology that deals with the design, construction, operation, structural disposition, manufacture and application of robots and computer systems for their control, sensory feedback, and information processing. These technologies deal with

automated machines that can take the place of humans, in hazardous or manufacturing processes, or simply just resemble humans. Many of today's robots are inspired by nature contributing to the field of bio-inspired robotics.



The history of robots

Modern concepts were begun to be developed when the Industrial Revolution allowed the use of more complex mechanics and the subsequent introduction of electricity made it possible to power machines with small compact motors. After the 1920s the modern formulation of a humanoid machine was developed to the stage where it was possible to envisage human sized robots with the capacity for near human thoughts and movements, first envisaged millennia before. The first uses of modern robots were in factories as industrial robots – simple fixed machines capable of manufacturing tasks which allowed production without the need for human assistance. Digitally controlled industrial robots and robots making use of artificial intelligence have been built since the 1960s

The background image shows a close-up of an orange industrial robotic arm. The arm is positioned vertically, with its gripper at the top. It appears to be working on a metal component, possibly a wheel or a large flange, which is visible in the lower right corner. Bright sparks are being generated at the point of contact, indicating a welding or grinding process. The background is slightly blurred, showing other industrial equipment and a factory environment.

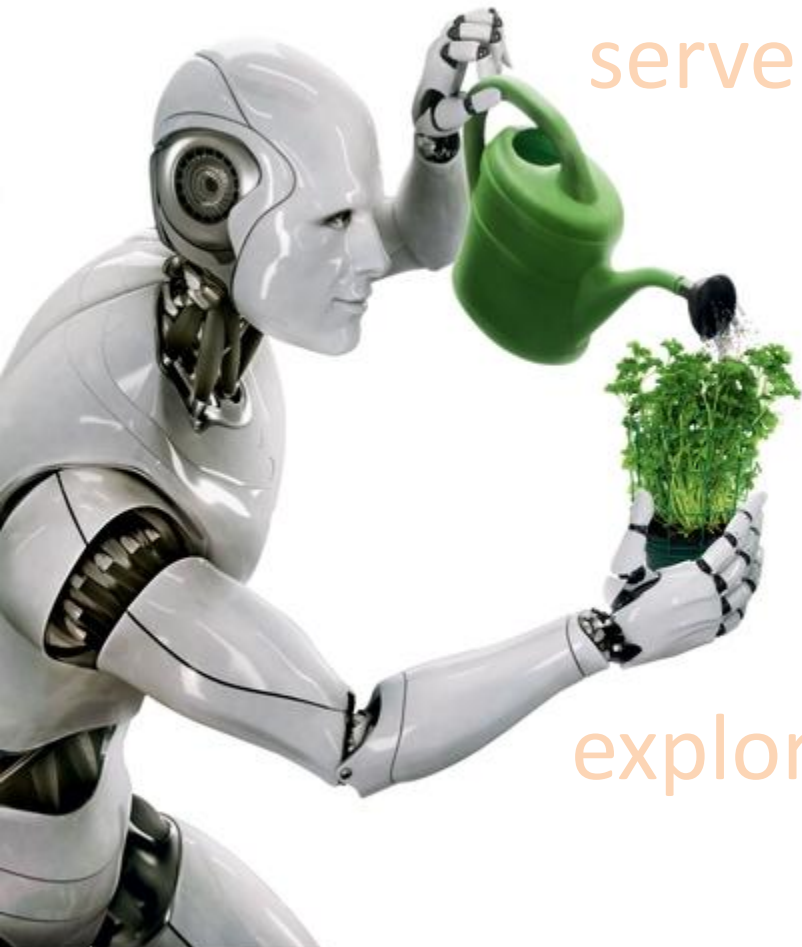
Education and training

Robotics engineers design robots, maintain them, develop new applications for them, and conduct research to expand the potential of robotics. Robots have become a popular educational tool in some middle and high schools, as well as in numerous youth summer camps, raising interest in programming, artificial intelligence and robotics among students.

First-year computer science courses

at several universities now include programming of a robot in addition to traditional software engineering-based coursework.





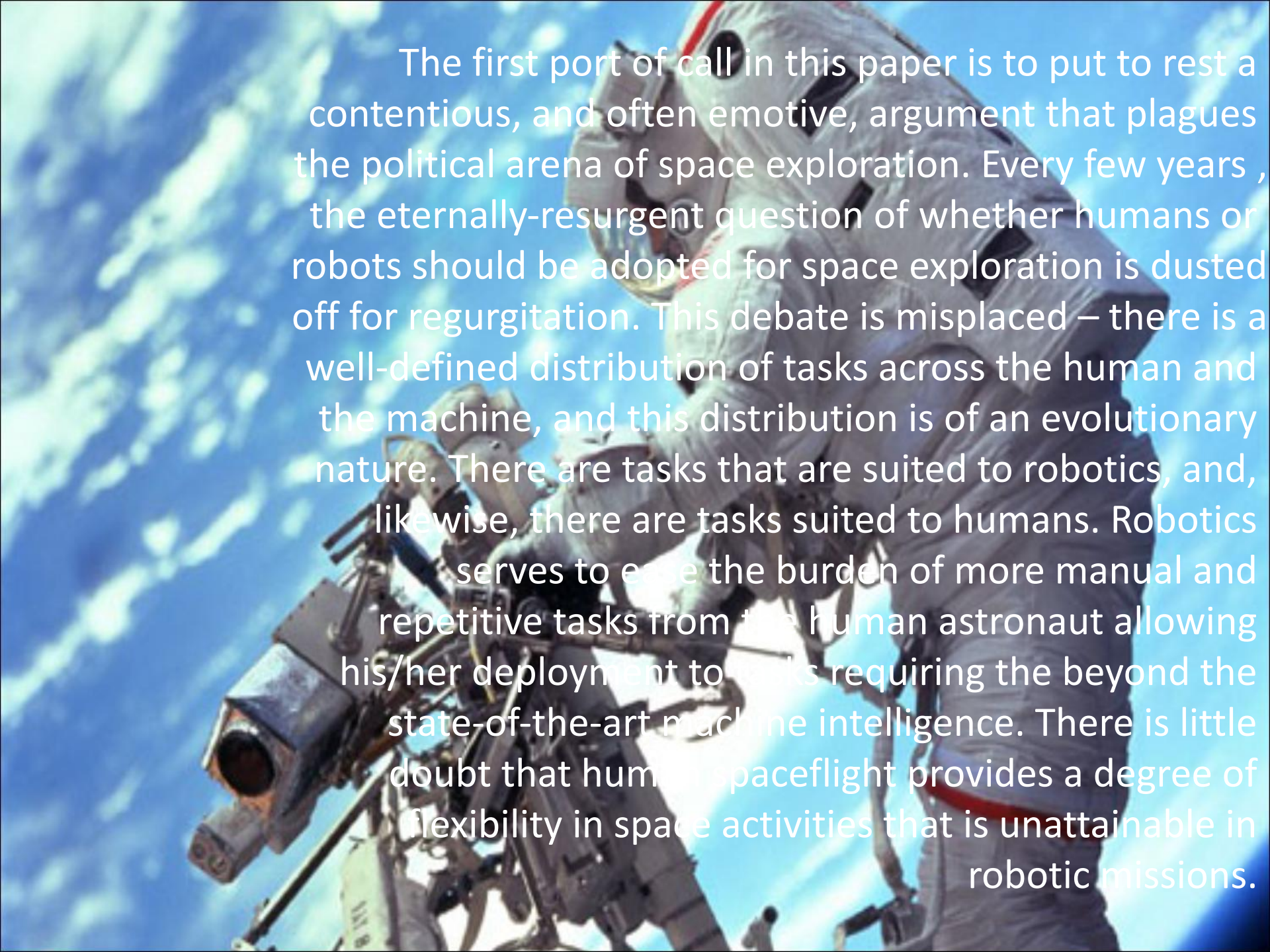
Today, robotics is a rapidly growing field, as we continue to research, design, and build new robots that serve various practical purposes, whether domestically, commercially, or militarily. Many robots do jobs that are hazardous to people such as defusing bombs, exploring shipwrecks, and mines.

The space environment represents one of the most challenging applications of robotics. Indeed, there is a widely-held but contentious viewpoint that space application represents a natural and inevitable arena for the advancement of robotics by imposing the requirement for high autonomy in space robotic systems.



The metric for success in space systems is the same
as that for biological organisms – survival in a
hostile and unrelenting
environment.



A photograph of two astronauts in white space suits working on a complex piece of equipment, likely part of a space station or shuttle. The background is a bright blue sky with wispy white clouds. The text is overlaid on the right side of the image.

The first port of call in this paper is to put to rest a contentious, and often emotive, argument that plagues the political arena of space exploration. Every few years, the eternally-resurgent question of whether humans or robots should be adopted for space exploration is dusted off for regurgitation. This debate is misplaced – there is a well-defined distribution of tasks across the human and the machine, and this distribution is of an evolutionary nature. There are tasks that are suited to robotics, and, likewise, there are tasks suited to humans. Robotics serves to ease the burden of more manual and repetitive tasks from the human astronaut allowing his/her deployment to tasks requiring the beyond the state-of-the-art machine intelligence. There is little doubt that human spaceflight provides a degree of flexibility in space activities that is unattainable in robotic missions.

As the capabilities of robotics become more sophisticated over time, so the role of humans will shift exclusively to tasks of greater complexity . However, human exploration missions will always require prior reconnaissance by robotic missions – robots do not suffer the fragility of the human body and can reach further into outer space than human beings.

