Journal of Mechatronics and Robotics

Original Research Paper

About Robotics, Mechatronics and Automation that Help us Conquer the Cosmic Space

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Article history
Received: 14-04-2019
Revised: 20-04-2019
Accepted: 04-05-2019

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Abstract: Here we have to mention that all these SF writings and many others that have existed over time, especially in the 20th century, have influenced alongside obvious screenings, young people and not just them, to think more about our role, robots, into a better world. The robot's key role is to help the man make his work easier, safer, more enjoyable, just like a computerized machine that helps us work faster and better, the robot has an obvious role in making work easier, to work in our place when we are tired, when work is exhausting and repetitive, when the environment is toxic, hostile, dangerous and in many other situations. However, it is time to say that the role of the robot in the future is altogether another, namely, to help us conquer the cosmic space to expand ourselves as a race in the whole universe in which we are now. In fact, this is the robot's humanitarian role and in the future, it can be developed and prepared just for that purpose. Exploratory robots are robots that operate in hard-to-reach and dangerous locations, telegraph or partially autonomous. They can work for example in a region in military conflict, on the Moon or on Mars. A geared navigation on the ground in the last two cases is impossible due to distance. Communication signals arrive at their destination in a matter of hours and their reception lasts as long. In such situations, robots have to be programmed with several types of behavior, from which they choose the most appropriate and execute it. This type of robot equipped with sensors was also used to research pyramid wells. Several cryobots (cryo robots) have already been tested by NASA in Antarctica. This type of robot can reach up to 3,600 m through the ice. Cryobots can thus be used in polar head research on Mars and Europe in the hope of alien living. NASA has always said that understanding how to live and work in space for long periods of time has been a key goal of the International Space Station. But, from the White House, it may seem expensive this race around the Earth, considering that the mission costs about $ 8 million a day. Space makes us anxious. We are anxious that things go smoothly as if space flight should be infallible like a flight to London. And we are looking forward to a return on investment. We fly in space because of human ambition, because nothing gives us more resistance than trying to do what we have not done before. And we're flying in space because space is the eighth continent. We may eventually need asteroid or lunar resources, depending on how we manage the resources we have here on Earth. Eventually, we should become a species that will conquer other planets, whether we are no longer inside or that we actually destroy it or it will be destroyed.

Keywords: Robots, Mechatronic Systems, Structure, Dynamics, Dynamics Systems, Machines, Space, NASA, International Space Station

Introduction

Today, robots have not only penetrated to create microchips in electronics but also in medicine, where it helps to perform difficult operations, especially where precision is needed and the size is small and any human error could be fatal to the patient. Robots assist the doctor in heart, brain, kidney operations, not to mention bone implants and repair of damaged bones, cartilage and muscles. In this area, new materials adapted to the requirements of the human body also play an important role. The robotic systems used in today's operating blocks are very expensive and bulky and they need to be permanently adapted and prepared before a difficult operation, but in the end their help is unsurpassed because the operation takes place with the help of the machine and the computer, so they can perform a giant precision of hundredth of a millimeter, precision that stops the scalpel from cutting accidentally such as a nerve, a blood vessel, healthy tissue and anything else. Assisted operation brings infinitely more advantages than the disadvantage that the operator block is voluminous and costly. However, apart from the related space, the costs are amortized over time and the satisfaction of the successful operations is great for both the patients and the medical team. Surgery has taken advantage of this technology relatively late. Initial use of robots in surgery began in the late 1980s when an industrial robot was used to support instruments for stereotactic biopsy in neurosurgery. Also in the late 1980s, IBM built the first robot used in clinical practice, called Robo-doc. The first use of a robot in human surgery was for a transurethral prostate resection. In 1993, Computer Motion, Inc. introduced a voice-controlled arm, Automated Endoscopic System for Optimal Positioning (AESOPTM), used to support instruments, of optics in laparoscopic surgery. Its version, AESOPTM 2000 is the first human-controlled robot approved by the Food and Drug Administration of the United States. In 1998, Reichenspurner introduced the ZEUS Microsurgical Robotic System into Germany. Today, the most complex and efficient robot in use is the daVinci system. With the birth of laparoscopy and information technology, surgery went into a new era. The development of surgical robots is primarily motivated by their desire the need to increase the effectiveness of surgical medical interventions. Medical actions are chosen based on information from various sources, including patient-specific data (vital signs and images of human body tissues and organs), general medical knowledge (atlases of human anatomy) and medical experiences. First, a robot can usually do things much more accurate than a man. This provides the first motivation for using CAD/CAM systems. Robots can be used successfully if the patient has been radiated (eg with X-radiation), thus not endangering the health of the medical team. Since ancient times, the imagination of mankind has been concerned with the idea of making cars equipped with artificial intelligence to execute operations similar to those performed by man. Technicians have been used for many years in various fields other than medical, such as the automotive industry, the underwater environment, the alien space, or the areas at risk of nuclear radiation.

A robot is a mechanic or virtually artificial engineer. The robot is a system composed of several elements: mechanical, sensors and actuators as well as a steering mechanism. The mechanics determine the appearance of the robot and the possible movements during operation. Sensors and actuators are used when interacting with the system environment. The targeting mechanism ensures that the robot accomplishes its goal successfully, for example by evaluating sensor information. This mechanism regulates the engines and plans the movements to be made. Robots with human form are called androids.

The basics of today's robots are far ahead. The first models of cars can be called automated (coming from the automated Greek, moving alone). They could do only one goal, being constrained by construction.

The Greek mathematician, Archytas, has, according to some accounts, built one of these automated primes: a propelled steamed pigeon that could fly alone. This wooden cavern was filled with air under pressure. It had a valve that allowed opening and closing by a counterweight. There have been many models over the centuries. Some made work easier and others served to people's amusement.

With the discovery of the 14th-century mechanical clock, new and complex possibilities have opened up. Not long afterward, the first machines appeared, which resembled the robots today. It was possible, however, that the movements followed one another without the need for manual intervention in that system.

The development of electro-technics in the twentieth century brought with it a development of robotics. Among the first mobile robots are the Elmer and Elsie system built by William Gray Walter in 1948. These tricycles could point to a light source and recognize collisions in the surroundings.

The year 1956 is considered as the birthday of the industrial robot. George Devol has applied this year in the US for a patent for "scheduled article transfer". A few years later he built together with Joseph Engelberger UNIMATE. This robot of approx. two tons was first introduced into the installation of TV iconoscopes and then found its way into the automotive industry. The programs for this robot were saved in the form of directional commands for motors on a magnetic cylinder. Since then, industrial robots as UNIMATE have been introduced in many production areas and are continually being developed to meet the complex demands that are required.

The heavy rise of robots in film and literature drew the attention of science to this type of machine. The scientific field, which deals with the construction of robots, is called robotics. The term was first used in 1942 by Isaac Asimov in his book Runaround. A general scientific theoretical field dealing with robots does not exist. These are mainly computer subdomains.

Most of the short stories of robots written by Asimov take place in the first epoch of positronic robotics and exploration of space. The special feature of robots in the

Asimov universe is the Three Laws of Robotics, implanted in the positronic brain, to which all robots of the Asimovian fiction must obey, ensuring their submission to the creators.

Initially, the stories were not designed as a whole, the only common element being the positronic robots - there are inconsistencies especially between stories and novels. However, they all share the theme of interaction between humans, robots and morality. Some of the anthologized stories in Robot, Robot Stories and later gathered alongside other stories in the same series in The Complete Robot, do not seem to belong to the same universe with the Foundation and the Robots. "Involuntary Victory" features positronic robots that obey the Three Laws, but also an extraterrestrial civilization that lives on Jupiter. "To unite" includes humanoid robots, but they belong to a different future (in which the Cold War still unfolds) and the Three Laws are not mentioned.

The first four robot novels (Steel Caverns, Empty Sun, Aurora Robots and Robots and the Empire) form the Elijah Baley series, being police novels in which the earthly detective Elijah Baley and his partner humanoid robot Daneel Olivaw appear. Their action takes place hundreds of years after the stories, focusing on the conflict between the Spaniards - the descendants of human colonists on other planets - and the overpopulated people on the Earth. There are some exceptions. "Mirror Image," one of the stories in the Complete Robot anthology, takes place between the naked Sun and the Robots on Aurora) and includes both Baley and Olivaw. The "Earthland" story, featured in the Campbell Period anthology, describes the time when the worlds of the world decided to separate from Earth.

In 1993, writer Robert Silverberg expanded Asimov's story "The bicentennial man" to the size of a novel. In this book, there are a series of events related to the collection of stories Eu, the robot and Dr. Han Fastolfe recalls in Robots on Aurora about Andrew Martin, the main character of Asimov's story. Considering these aspects, one can also consider that this novel is in series.

Since the first of the robot novels were written before 1962, they did not receive SF prizes like Hugo, which was later. As far as the last two are concerned, they were written at a time when they could be rewarded with prizes. Robots on Aurora were nominated for the Hugo and Locus Awards in 1984, while Robots and the Empire were on the short list of Locus Awards for "Best Roman Science Fiction" in 1986.

A source of inspiration for Asimov was the Zoromes mechanic race from the story "The Jameson Satellite" written by Neil R. Jones in 1931.

Asimov read the story when he was 11 years old and mentioned it as a source of inspiration in the volume Before the Golden Age (1975), an anthology of the SF of the 1930s, in which Asimov relates the story of the SF he read during childhood and adolescence. As he himself says:

> "Since the first appearance of the Zoromes mechanic in" The Jameson Satellite, "I came to the idea of benevolent robots that can serve people with decency, just as they did with Professor Jameson. These Zoromes are the spiritual ancestors of my "positronic robots," from Robbie to R. Daneel

Asimov integrated the Robots series into the most comprehensive series of the Foundation, bringing Daneel Olivaw back twenty thousand years later, in the time of the Galactic Empire, into the continuations and preludes of the original trilogy of the Foundation. In the last book of Robots-The Robots and the Empire-there is a story about how the worlds that later formed the Empire and how the Earth became a radioactive Earth.

Star Powder explicitly states that Earth has become radioactive following a nuclear war.

Asimov later solved the apparent inconsistency, explaining that this was the case in memory of the earthly people a few centuries after his party, the alteration of the information due to the loss of an important part of their planetary history.

One of the inconsistencies of the series is the method of producing energy on Earth. In the robot, the main method is that of the solar space stations, which have come to be overcome during the interview with Susan Calvin. On the other hand, in the Steel-Roman Caverns, whose action takes place hundreds of years after those in Eu, the robot-the main source of energy is uranium-based nuclear power stations, while solar space stations are confronted with issues that still can not be resolved. Subsequently, Robots and the Empire state that uranium is no longer used for a long time, nuclear fusion reactors have not been used for a long time, almost all of the energy coming from solar space stations.

Another incoherence is the development of the positronic brain. By the end of the book I, the robot appears "machines"-brains strong enough to calculate the consequences of people's actions and to recommend it on a global scale, even claiming that a human robot cannot be distinguished from a man at an external examination at least by a robot psychologist. On the other hand, the Elijah Baley series does not contain such magnitude positron creatures and humanoid robots are easily distinguished by humans.

In the naked Sun, one of the main elements of the intrigue is the ability of R. Daneel to impersonate an aurora arriving on Solaria, without the solariums or robots realizing that he is, in fact, a humanoid robot. On the other hand, in the Robots on Aurora, Elijah Bailey and Daneel have an ample dialogue about the fact that no Spatial-robot can never mistake a humanoid robot of the type of Daniel with a true man because of the mechanical behavior and the manners of the robot.

The Foundation's Friends The Foundation's Friends included the following stories about positronic robots:

"Balance" by Mike Resnick, "Pata" by Hal Clement, "Pappi" by Sheila Finch, "Plato cave" by Poul Anderson, "The Fourth Law of Robotics" by Harry Harrison and Robert Sheckley's "Caravan on the Asphalt Plate". Not all of these stories are in full compliance with Asimov's stories.

The anthology also included the story "The Challenge" written by Pamela Sargent, whose action takes place during the novels with Elijah Baley.

Shortly before his death in 1992, Asimov approved the project for three novels (Caliban, Inferno, Utopia) by Roger MacBride Allen, whose action takes place between the Robots and the Empire and the Galactic Empire Series.

The three novels tell the story of the Terraformation of the Inferno Space Sphere and of the robotic revolution that began with the creation of a Non-Law Robot and then of the Robots of the New Law.

There are other novels written by various authors (belonging to Robot's Isaac Asimov's Robots / Isaac Asimov's Robots in Time), poorly connected with the Robots Series, containing many contradictions with Asimov's books and not considered, in general, as belonging to the canon of the series.

In November 2009, Isaac Asimov's patrimony announced that the first novel of a trilogy about Susan Calvin, Robots and Chaos, written by fantasy author Mickey Zucker Reichert, is being prepared. The book appeared in November 2011 under the title "Robot: To Protect".

The first screening of Asimov's robot story was made during the third episode of the British television series Out of This World and was based on "A Robot Lost" (1962). In Leo Lehman's drama and having Maxine Audley in the role of Susan Calvin, this is the only episode of the series that still exists today.

It was followed in 1964 by the screening of the novel The Steel Caverns for the BBC Story Parade series, followed by four episodes for the TV series of BBC Out of the Unknown based on "Satisfaction Guaranteed" (1966), "Reasoning (in the episode" The (1969) and the naked sun (1969). In these screenings, Elijah Baley was interpreted by Peter Cushing (Steel Caverns) and Paul Maxwell (the naked sun), R. Daneel Olivaw by John Carson And David Collings and Susan Calvin by Beatrix Lehmann ("The Prophet") and Wendy Gifford (The Liar). In "Satisfaction Guaranteed," Susan Calvin's character was renamed Dr. Inge Jensen, being played by Ann Firbank.

Towards the late 1970s, Harlan Ellison wrote a script for Warner Bros based on Asimov I, the robot. The film's project was eventually abandoned, but Ellison's script was later published in Volume I, Robot: The Illustrated Screenplay (1994).

The 1988 Robots TV film is based on Asimov's Robot series and includes Stephen Rowe as Elijah Baley and Brent Barrett in R. Daneel Olivaw's.

"The Bicentennial Man" (1999) was the first adaptation for the big screen of a story or books by Asimov and was based on both the original story of Asimov and the extension to the size of a Roman poster novel by Robert Silverberg. Role of Rob Andrew Martin was performed by Robin Williams.

Twentieth Century Fox's film I, the robot (2004), presented an original story that took place in the universe of Asimov, with Dr. Susan Calvin and other characters appearing in the stories collection I, the robot.

The film is based on a script written in 1995 by Jeff Vintar and entitled 'Hardwired'. While the original scenario did not have direct links with Asimov, it was sufficiently 'asymovian' (being a police story whose action was in a 'locked room' with robots as suspects) to provide a starting point a movie like me, the robot. Various elements of Asimov's stories were woven across the intrigue, including "A Robot Lost," "Avoiding Conflict," and "Robot Dreams." Will Smith played the role of Del Spooner and Bridget Moynahan and Susan Calvin.

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In fact, this is the robot's humanitarian role and in the future, it can be developed and prepared just for that purpose (Rulkov *et al*., 2016; Agarwala, 2016; Babayemi, 2016; Gusti and Semin, 2016; Mohamed *et al*., 2016; Wessels and Raad, 2016; Maraveas *et al*., 2015; Khalil, 2015; Rhode-Barbarigos *et al*., 2015; Takeuchi *et al*., 2015; Li *et al*., 2015; Vernardos and Gantes, 2015; Bourahla and Blakeborough, 2015; Stavridou *et al*., 2015; Ong *et al*., 2015; Dixit and Pal, 2015; Rajput *et al*., 2016; Rea and Ottaviano, 2016; Zurfi and Zhang, 2016 a-b; Zheng and Li, 2016; Buonomano *et al*., 2016 a-b; Faizal *et al*., 2016; Ascione *et al*., 2016; Elmeddahi *et al*., 2016; Calise *et al*., 2016; Morse *et al*., 2016; Abouobaida, 2016; Rohit and Dixit, 2016; Kazakov *et al*., 2016; Alwetaishi, 2016; Riccio *et al*., 2016 a-b; Iqbal, 2016; Hasan and El-Naas, 2016; Al-Hasan and Al-Ghamdi, 2016; Jiang *et al*., 2016; Sepúlveda, 2016; Martins *et al*., 2016; Pisello *et al*., 2016; Jarahi, 2016; Mondal *et al*., 2016; Mansour, 2016; Al Qadi *et al*., 2016b; Campo *et al*., 2016; Samantaray *et al*., 2016; Malomar *et al*., 2016; Rich and Badar, 2016; Hirun, 2016; Bucinell, 2016; Nabilou, 2016b; Barone *et al*., 2016; Chisari and Bedon, 2016; Bedon and Louter, 2016; Santos and Bedon, 2016; Minghini *et al*., 2016;

Bedon, 2016; Jafari *et al*., 2016; Chiozzi *et al*., 2016; Orlando and Benvenuti, 2016; Wang and Yagi, 2016; Obaiys *et al*., 2016; Ahmed *et al*., 2016; Jauhari *et al*., 2016; Syahrullah and Sinaga, 2016; Shanmugam, 2016; Jaber and Bicker, 2016; Wang *et al*., 2016; Moubarek and Gharsallah, 2016; Amani, 2016; Shruti, 2016; Pérez-de León *et al*., 2016; Mohseni and Tsavdaridis, 2016; Abu-Lebdeh *et al*., 2016; Serebrennikov *et al*., 2016; Budak *et al*., 2016; Augustine *et al*., 2016; Jarahi and Seifilaleh, 2016; Nabilou, 2016a; You *et al*., 2016; AL Qadi *et al*., 2016a; Rama *et al*., 2016; Sallami *et al*., 2016; Huang *et al*., 2016; Ali *et al*., 2016; Kamble and Kumar, 2016; Saikia and Karak, 2016; Zeferino *et al*., 2016; Pravettoni *et al*., 2016; Bedon and Amadio, 2016; Chen and Xu, 2016; Mavukkandy *et al*., 2016; Yeargin *et al*., 2016; Madani and Dababneh, 2016; Alhasanat *et al*., 2016; Elliott *et al*., 2016; Suarez *et al*., 2016; Kuli *et al*., 2016; Waters *et al*., 2016; Montgomery *et al*., 2016; Lamarre *et al*., 2016; Daud *et al*., 2008; Taher *et al*., 2008; Zulkifli *et al*., 2008; Pourmahmoud, 2008; Pannirselvam *et al*., 2008; Ng *et al*., 2008; El-Tous, 2008; Akhesmeh *et al*., 2008; Nachiengtai *et al*., 2008; Moezi *et al*., 2008; Boucetta, 2008; Darabi *et al*., 2008; Semin and Bakar, 2008; Al-Abbas, 2009; Abdullah *et al*., 2009; Abu-Ein, 2009; Opafunso *et al*., 2009; Semin *et al*., 2009 a-c; Zulkifli *et al*., 2009; Marzuki *et al*., 2015; Bier and Mostafavi, 2015; Momta *et al*., 2015; Farokhi and Gordini, 2015; Khalifa *et al*., 2015; Yang and Lin, 2015; Chang *et al*., 2015; Demetriou *et al*., 2015; Rajupillai *et al*., 2015; Sylvester *et al*., 2015a; Ab-Rahman *et al*., 2009; Abdullah and Halim, 2009; Zotos and Costopoulos, 2009; Feraga *et al*., 2009; Bakar *et al*., 2009; Cardu *et al*., 2009; Bolonkin, 2009 a-b; Nandhakumar *et al*., 2009; Odeh *et al*., 2009; Lubis *et al*., 2009; Fathallah and Bakar, 2009; Marghany and Hashim, 2009; Kwon *et al*., 2010; Aly and Abuelnasr, 2010; Farahani *et al*., 2010; Ahmed *et al*., 2010; Kunanoppadon, 2010; Helmy and El-Taweel, 2010; Qutbodin, 2010; Pattanasethanon, 2010; Fen *et al*., 2011; Thongwan *et al*., 2011; Theansuwan and Triratanasirichai, 2011; Al Smadi, 2011; Tourab *et al*., 2011; Raptis *et al*., 2011; Momani *et al*., 2011; Ismail *et al*., 2011; Anizan *et al*., 2011; Tsolakis and Raptis, 2011; Abdullah *et al*., 2011; Kechiche *et al*., 2011; Ho *et al*., 2011; Rajbhandari *et al*., 2011; Aleksic and Lovric, 2011; Kaewnai and Wongwises, 2011; Idarwazeh, 2011; Ebrahim *et al*., 2012; Abdelkrim *et al*., 2012; Mohan *et al*., 2012; Abam *et al*., 2012; Hassan *et al*., 2012; Jalil and Sampe, 2013; Jaoude and El-Tawil, 2013; Ali and Shumaker, 2013; Zhao, 2013; El-Labban *et al*., 2013; Djalel *et al*., 2013; Nahas and Kozaitis, 2013; Petrescu and Petrescu, 2014 a-i, 2015 a-e, 2016 a-d; Fu *et al*., 2015; Al-Nasra *et al*., 2015; Amer *et al*., 2015; Sylvester *et al*., 2015b; Kumar *et al*., 2015; Gupta *et al*., 2015; Stavridou *et al*., 2015b; Casadei, 2015; Ge and Xu, 2015; Moretti, 2015; Wang *et al*., 2015; Antonescu and Petrescu, 1985; 1989; Antonescu *et al*., 1985a; 1985b; 1986; 1987; 1988; 1994; 1997; 2000a; 2000b; 2001; Aversa *et al*., 2017a; 2017b; 2017c; 2017d; 2017e; 2016a; 2016b; 2016c; 2016d; 2016e; 2016f; 2016g; 2016h; 2016i; 2016j; 2016k; 2016l; 2016m; 2016n; 2016o; Cao *et al*., 2013; Dong *et al*., 2013; Comanescu, 2010; Franklin, 1930; He *et al*., 2013; Lee, 2013; Lin *et al*., 2013; Liu *et al*., 2013; Padula and Perdereau, 2013; Perumaal and Jawahar, 2013; Petrescu, 2011; 2015a; 2015b; Petrescu and Petrescu, 1995a; 1995b; 1997a; 1997b; 1997c; 2000a; 2000b; 2002a; 2002b; 2003; 2005a; 2005b; 2005c; 2005d; 2005e; 2011a; 2011b; 2012a; 2012b; 2013a; 2013b; 2013c; 2013d; 2013e; 2016a; 2016b; 2016c; Petrescu *et al*., 2009; 2016; 2017a; 2017b; 2017c; 2017d; 2017e; 2017f; 2017g; 2017h; 2017i; 2017j; 2017k; 2017l; 2017m; 2017n; 2017o; 2017p; 2017q; 2017r; 2017s; 2017t; 2017u; 2017v; 2017w; 2017x; 2017y; 2017z; 2017aa; 2017ab; 2017ac; 2017ad; 2017ae; 2018a; 2018b; 2018c; 2018d; 2018e; 2018f; 2018g; 2018h; 2018i; 2018j; 2018k; 2018l; 2018m; 2018n).

Materials and Methods

Artificial intelligence is part of computer science and represents the study and design of intelligent agents that understand the environment and take action.

John McCarthy, who founded the idea in 1956, defines artificial intelligence as "science and intelligence engineering."

The big challenge is to build an intelligent car like a Homo Sapiens. This aspect raises philosophical problems about the nature of the mind and the scientific boundaries, problems transmitted through fiction and philosophy since antiquity.

Artificial intelligence is treated by many with skepticism, claiming that it will not be possible to create a smart robot like a human.

A smart robot must have the ability to deduce, rationalize and solve the problems encountered. We will have to develop a human brain-like mechanism to represent knowledge. Such a robot must have the ability to plan, learn, process natural language, represent and call upon the knowledge already acquired. They will have to "have" creative intelligence, create new concepts and ideas and, last but not least, have self-consciousness.

And as the cognitive psyche is not enough, we are still challenging: designing the emotional psyche. Such a robot will have feelings, basically ... will live in his own way.

The ability to plan is essential. This will help the robot to propose some goals and then try to meet them. The robot will need to be able to visualize the future and take action to improve the way to reach that goal. This requires predictions about how his actions will change the future.

In planning issues, the robot will have to reverify periodically if its predictions have come true and, where appropriate, take new decisions. Joint planning is another aspect and involves more robots.

Robots must be able to plan events. Algorithms have been written to create puzzles, play various games, or logical deductions. Logic is not too difficult to translate into a programming language. Methods were made in which software programs were dealing with unreliable or incomplete information and the deduction was required.

But for hard problems these algorithms require enormous resources, the time to solve it and the necessary memory have become astronomical figures. And here, there is a need for more efficient methods.

Knowledge representation is another central theme in the research of artificial intelligence.

Here we are struck by another problem. A robot must represent objects, properties, categories and relationships between objects, situations, events, etc. Knowing the surrounding world becomes a problem.

Although at the base, the mechanisms of a single neuron are known and are quite similar to the logic gates in a computing system, there are differences in storing information. As a structure, computer memory is not relational. We will have to make a program to make it that way.

The robot must be able to learn. Learning is an essential process in the evolution and development of intelligence. In the human brain, the information from the outside is memorized in relation to the already existing ones. We notice that an idea that contains already known elements can be saved more easily than another that contains unknown things until then. In order to memorize an idea more easily, we must link it mentally to another, with well-fixed roots, with elements already known.

Learning not only involves memorizing raw information but also consciousness and understanding. Otherwise, this information will not be of any help.

This gives cars the ability to read and understand people's language. It is extremely necessary for communicating with people. Progress has been made in this area, but far from being perfection

The robot must be able to manipulate the objects around it. He has to look for, locate objects, create maps of the environment and plan his movements in space.

Perception is the ability of robots to use information obtained from the sensors (cameras, microphones, sonar and other devices) to deduce aspects of the world around. But there are major issues in recognizing objects, their human voice and their faces

Exploratory robots are robots that operate in hard-to-reach and dangerous locations, telegraph or partially autonomous. They can work for example in a region in military conflict, on the Moon or on Mars. A geared navigation on the ground in the last two cases is impossible due to distance. Communication signals arrive at their destination in a matter of hours and their reception lasts as long. In such situations, robots have to be programmed with several types of behavior, from which they choose the most appropriate and execute it.

This type of robot equipped with sensors was also used to research pyramid wells. Several cryobots (cryo robots) have already been tested by NASA in Antarctica. This type of robot can reach up to 3,600 m through the ice. Cryobots can thus be used in polar head research on Mars and Europe in the hope of alien living.

Results and Discussion

Astronauts live and work in orbit and the Houston Mission Control Center practically never sleeps. The International Space Station (Fig. 1-6) is a permanent space colony, inaugurated one year before the iconic film 2001: Space Odyssey.

We remain fascinated by the possibilities, discoveries and travels in space. Especially Sci-Fi. The 2013 Gravity movie with Sandra Bullock and George Clooney brought hundreds of millions of dollars to a box office and won seven Academy Awards. And the movie Life (2017) is a great one. But we are indifferent to what is happening in reality. Without the fanfare, I entered the era of Captain Kirk and Spock. We know fictional characters better than real ones. Perhaps not surprising, everyday life on the station does not have the drama of a film script, but we will try to find out in this article how to live in space for six months.

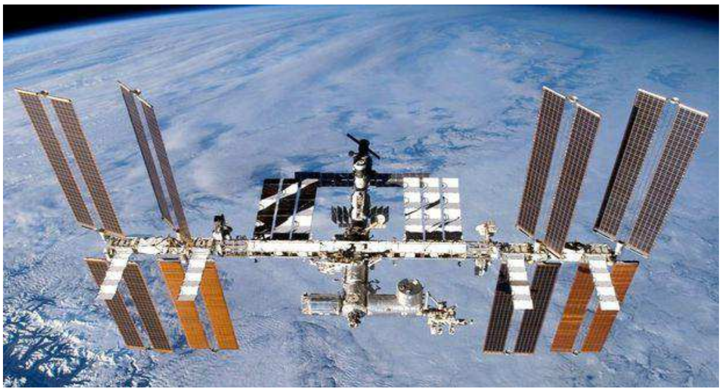

Fig. 1: The international space station

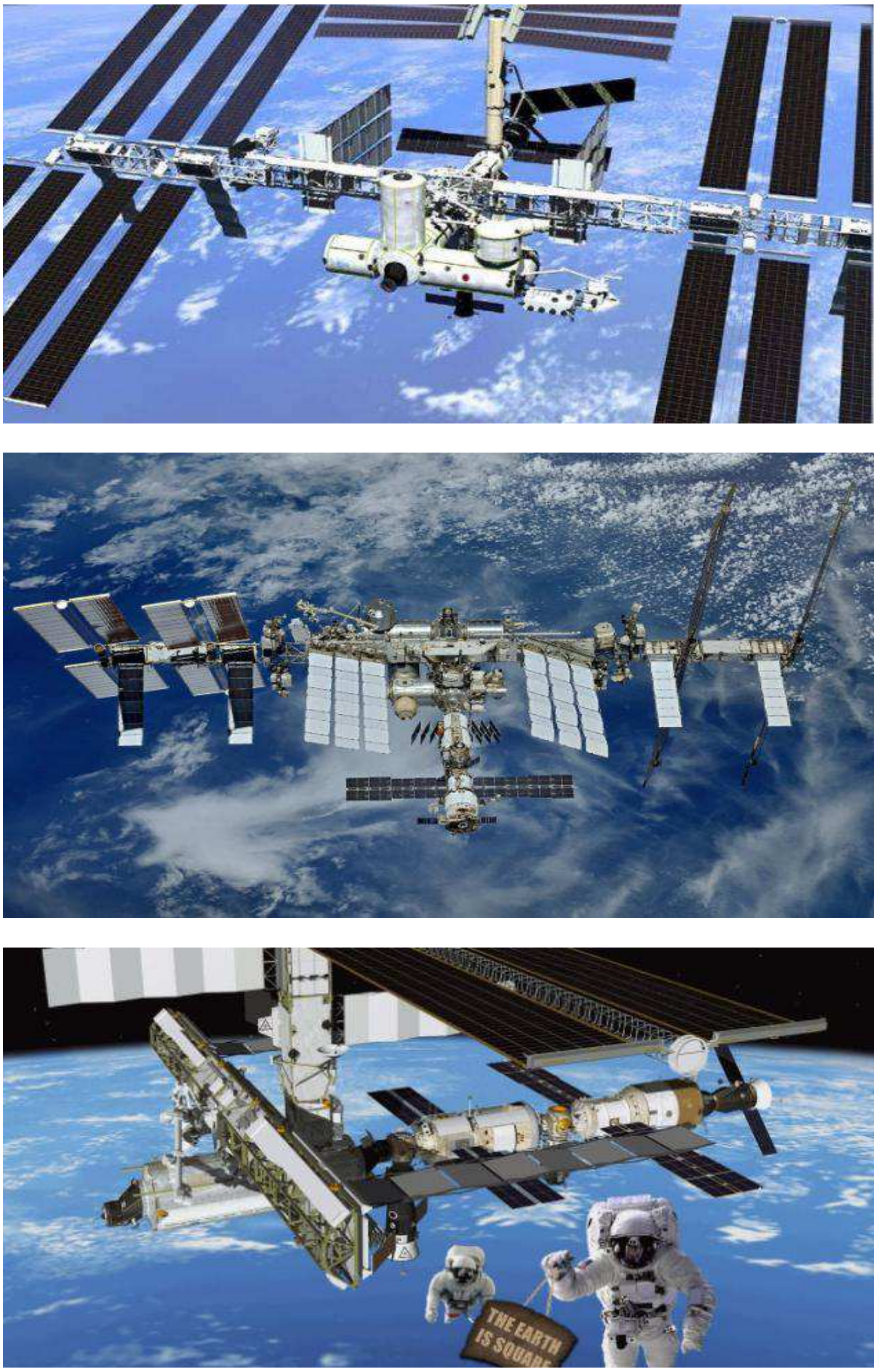

Fig. 2: The international space station

The International Space Station is a huge outpost. From the edge of a solar panel to the edge of the opposite, the station measures as much a football pitch and weighs about 450 tons. It is so great that it can be seen with the naked eye at night. This is also due to low orbit at an altitude that varies between 319.6 km and 346.9 km. Orbital speed is 7.67 km/s, or 27,600 km/h. An orbit (rotation around the Earth) lasts for 92.65 minutes and one day the station takes an Earth detour 15.54 times.

Five major space agencies are participating in this project: NASA (USA), RKA (Russia), JAXA (Japan), CSA (Canada) and ESA (European Spatial Agency). The responsibilities of the station's navigation and operation are shared and the role of the station commander alternates between Americans and Russians. American and Russian astronauts work in their own modules, but crews often gather for meals after work hours.

The space station is both a space ship and a home. He has his own personality, with good and bad things. Crew members come and go, bringing their own style, but the station itself imposes a certain rhythm and tone. It has a much more sophisticated system of water recycling than on Earth. An astronaut who mixes an orange drink for breakfast on Monday morning and urinates in the afternoon can use the same purified water to make a fresh drink for Thursday. However, the station does not have a refrigerator or freezer for food (there is a freezer for scientific experiments). Even though the food is much better than 20 years ago, most of it is still vacuum or canned. The arrival of some oranges every two months on the ship is a reason to party.

In 2009, with the expansion of the International Space Station, the US has installed some private cabinets. Here astronauts can sleep and enjoy for hours of intimacy and quiet, away from video cameras. Each cabin is upholstered in white material and equipped with a sleeping bag attached to an interior wall.

Mike Hopkins, who has "lived" on the International Space Station for 6 months, says that "on Earth when I had a long day, when mentally and physically tired and stretching on my bed, there was a feeling of relief. You g*et a* load on your fe*et a*nd you immediately feel relaxed. In space, you never feel that. You never have the feeling of taking your weight off your feet."

Some astronauts bind with some strings to somehow feel like they are lying in a bed. "The astronauts who let their arms out of their sleeping bag, float freely and look like bald dancers," says Hopkins.

Hopkins says he does not have unusual dreams in space, although now back to Earth, he sometimes dreams of floating through the station.

On the station, even the ordinary becomes strange. Exercise Bike for American astronauts has no handlebars. Nor does it have it. Without gravity, you can watch a movie while pedaling, letting your laptop float wherever you want.

Astronauts had to be careful not to stay in one place for too long. Without gravity to help circulate the air, expired carbon dioxide tends to form a cloud around the head and can lead to headaches. The station is today equipped with fans to meet this problem.

Since the first components have been released, 216 men and women have lived on the station and NASA has learned a lot about how you can live in space - about the difference in the transition from gravity to zero-G and how to survive months without gravity.

Life on the station does not look like anything on Earth. It's more exciting. And when astronauts go out into space, it can be thrilling and dangerous at the same time. Space is a cold and unforgiving place - a wrong maneuver can trigger a disaster. NASA has returned the risk by writing procedures for almost anything. From replacing a water filter up to the safety checks of a space suit.

Fig. 3: The international space station

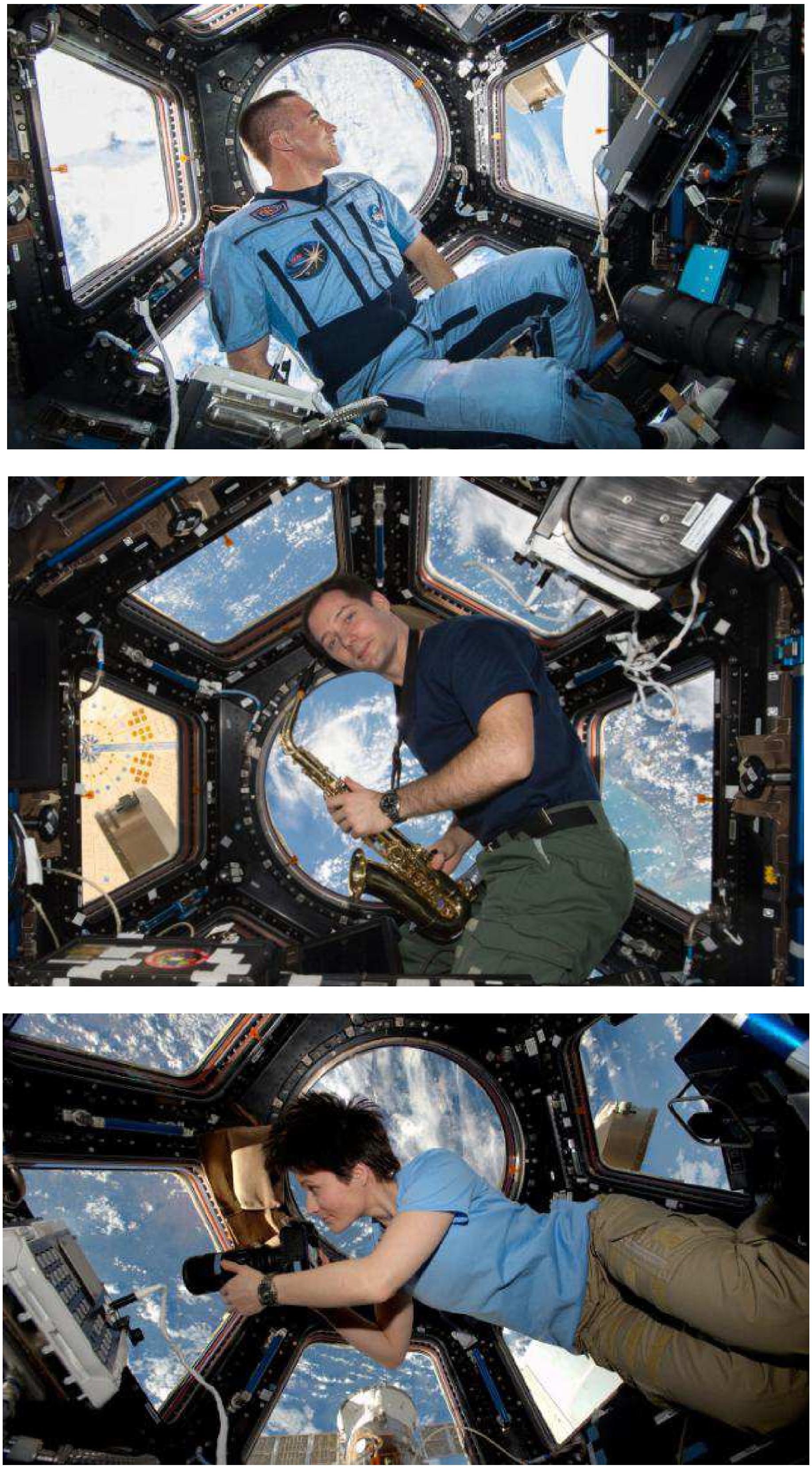

Fig. 4: The international space station

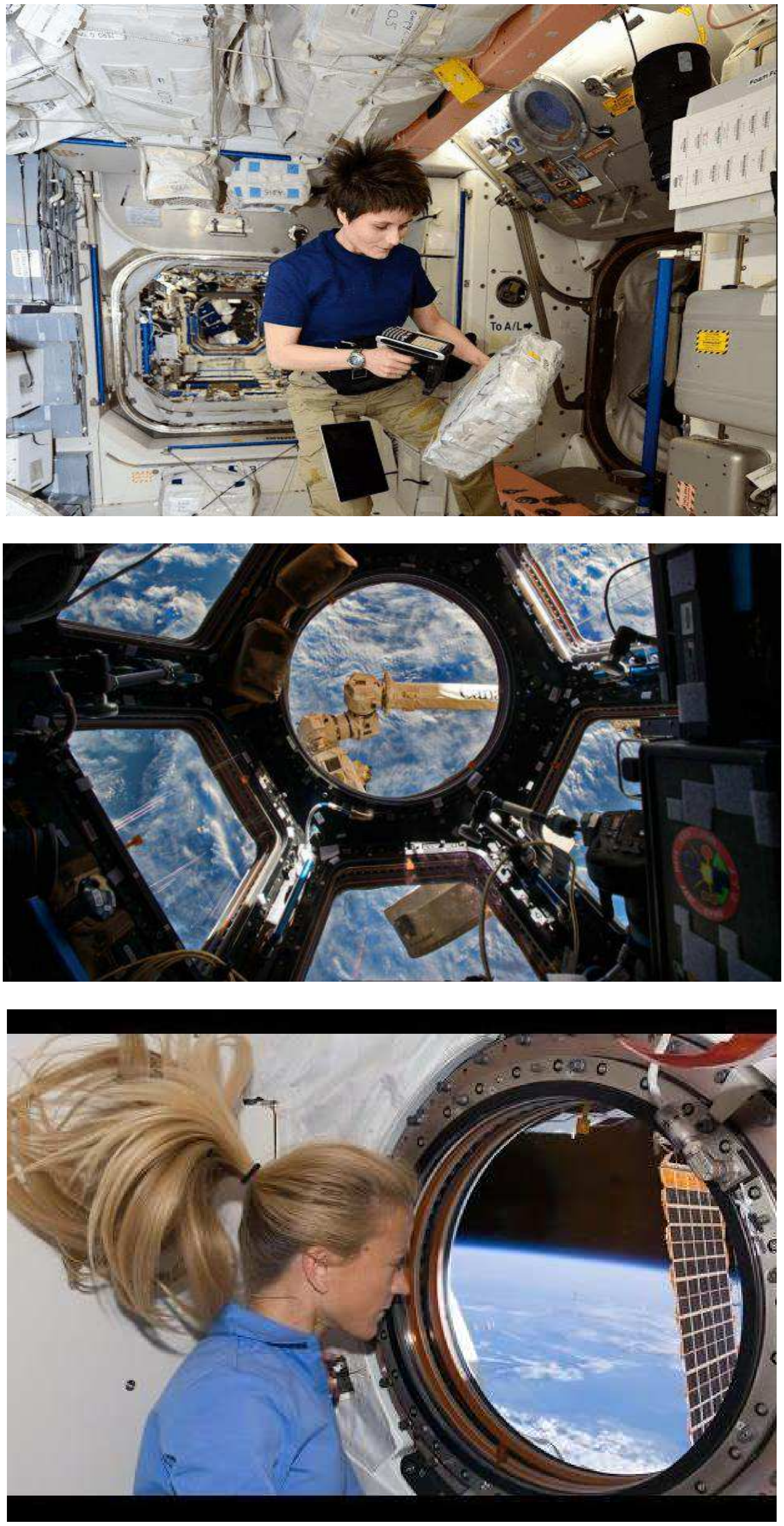

Fig. 5: The international space station

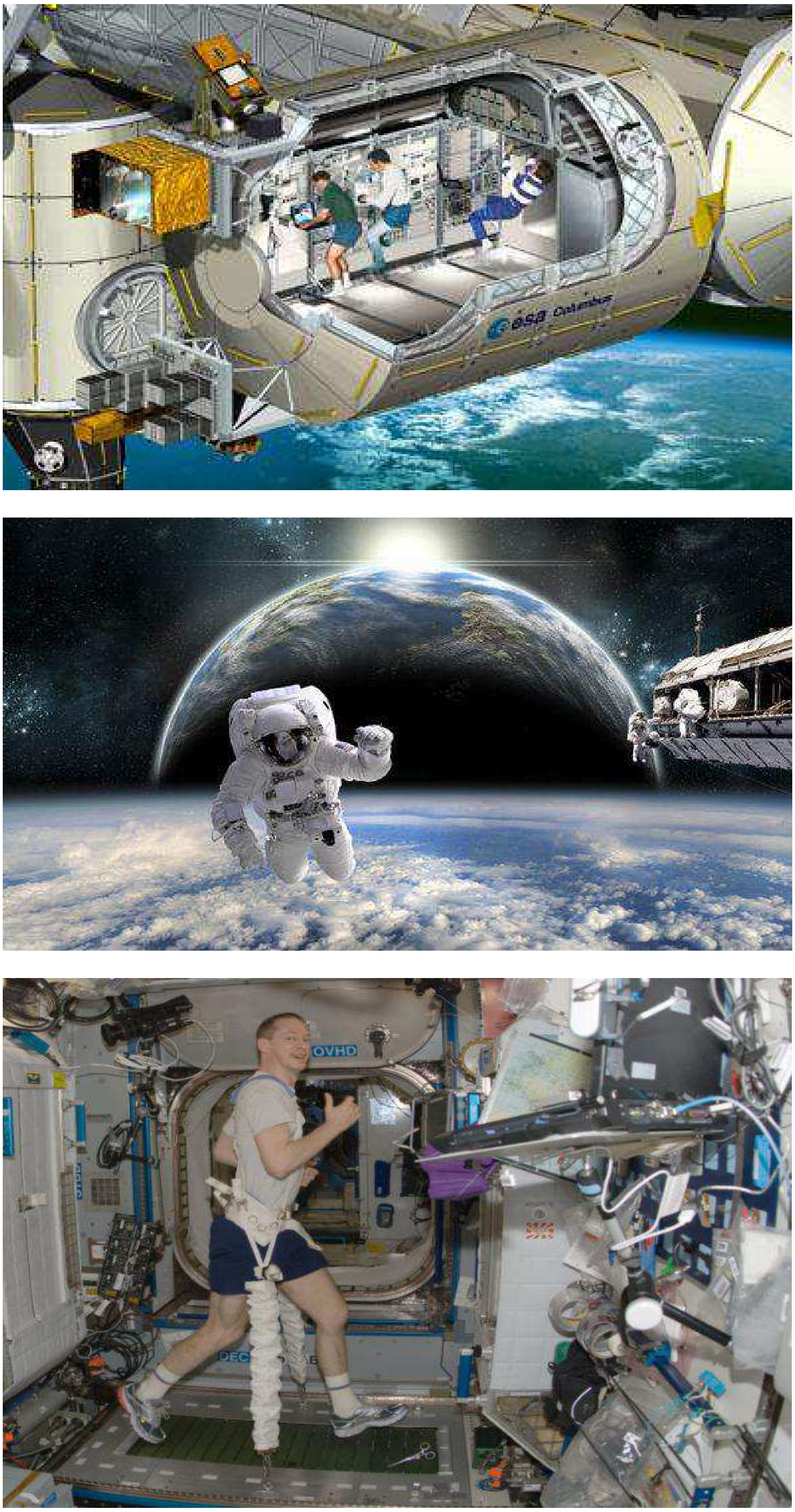

Fig. 6: The international space station

In 60 years of space, NASA suffered three fatal accidents in which 17 people died: the Apollo 1 capsule fired in 1967, Challenger was destroyed in 1986 and the last, the Columbia ship exploded in 2003. But neither one of these accidents did not happen due to astronauts.

Just after the slightest estimates, the International Space Station costs about $ 350,000 per hour, which makes astronauts time a very expensive resource. For this reason, astronauts start working at 7: 30 in the morning and end at 19:00. Even on weekends, they are not free, Saturday is devoted to cleaning the station and on Sunday, inevitably, some work appears.

From 2003 to 2010, 10 US astronauts living on the station had a diary in a research study by Jack Stuster, an anthropologist who studies people living in extreme environments. Anonymous diaries reveal people who are excited about living in space and occasionally bored and sometimes seriously irritated.

"I laughed alone today reading the procedures," wrote an astronaut. "To replace a bulb, I needed to have safety glasses and a vacuum cleaner at my fingertips. That's what happens if the bulb breaks. However, the bulb itself is encapsulated in a plastic case, so even if the bottle breaks, the shards will not be scattered. I also had to take a picture of the bulb installed before it started. Why? I have no idea! It's just how NASA is doing. "

"Astronauts never get tired of looking at the Earth" - wrote an astronaut. He was so captivated that he looked through the window an entire Earth orbit. "I looked at Earth from the point of view of an alien visitor," wrote another astronaut. "Where would I land and how would I first contact people?"

Writing in the diary shows very clearly that six months is a long period of time-without families and without friends, without fresh food, without feeling wind, rain or pleasure of gravity. A long period of time in which you are in charge of maintaining the station. Records also show that keeping a journal significantly improves the morale of an astronaut.

During short missions, the enthusiasm of being in space does not diminish. On the station, however, NASA had to be more attentive to the morale of astronauts, because it is a lot of work and most of the time uninteresting. The International Space Station has a phone call from where astronauts can call who they want. Astronaut families receive tablets for private video conferencing. And astronauts have private conversations with NASA psychologists once every two weeks.

In space, says Mike Hopkins, "everything is new. From hygiene, supper to rest, everything is completely different. " This is the opinion of someone who was trained every day two years before launch.

"How would we live in zero gravity?" Asks Sandra Magnus, who took part in 3 space flights, including 130 days per station. "It's really fun," she says, then bursts into laughter. "I learned to transport my things with my knees. That way I had my hands to move. Gravity is an indispensable tool and you do not appreciate it until you have to live without it. Look around the room you're in ... there's stuff sitting on the tables, on the shelves, in the drawers, on the floor. In space, all this would be everywhere. Every object you use must be caught or it will float. " Astronauts spend enough time looking for lost gear. "Tracking things can eat all day," says astronaut Mike Fincke.

Sandra Magnus liked to cook for colleagues on the station, finding new dishes from the ingredients sent by NASA. "To cook it takes good hours, so I could only cook over the weekend," says Sandra. "Why? Think of one thing: when you cook, you'll throw the scrap into the garbage. The station can not. We used a piece of adhesive tape, but even so, cooking took a lot longer."

Mike Fincke spent more time in space than any other American - 381 days in 3 missions. He made nine exits in space, cumulating a total of 48 hours. Mike studied at MIT and Standford and graduated from the U.S. Air Force Test Pilot School before becoming an astronaut.

"A little push with your big toe and you'll walk half of the station. It's like you're a Superman, "says Mike Fincke.

How Does It Affect Health?

Under zero gravity conditions, all body fluids are also in zero gravity, so astronauts often have a feeling of clutter.

Lack of gravity causes nausea. 54-year-old Leroy Chiao retired after four flights and described what was going on just before leaving the chair. "Your inner ear thinks you are overturning. The feeling of balance is everywhere ... Meanwhile, your eyes tell you that you will not roll, stand in a vertical position. The two systems send all this contradictory information to your brain. This can be disturbing, for this reason, some astronauts feel nauseated. "After the first days - really difficult for astronauts - they learn to ignore the panic of the inner ear and" space disease "disappears.

Astronauts lose bone mass, but they regenerate in part in response to the exercises that they do every day. Without gravity, the rate at which cells revert slows down and thin bones weaken.

Mark Guilliams is NASA's main coach for NASA astronauts. He works at the Johnson Center in Houston where he has over 40 active American astronauts.

"Life in zero gravity is the equivalent of a prolonged stay in a hospital," says Guilliams. "You lose muscle, you lose the volume of blood."

"Without gravity, sweating is not pleasant. On Earth, when you ride a bicycle, sweat runs out of you. Upon the station, sticks to you, around your arms, your head, around your eyes."

The attention to fitness is equally important in terms of science and the future, as it is about keeping an astronaut in a healthy state. NASA is worried about two things: recovery time when astronauts return home and maintain fitness for two years or more as they would take to make a round trip on Mars. If astronauts lose 10% of cardio, how much does their life be affected on the station? "Not too much," says Guilliams, "but if we go to Mars, that loss could be critical."

We still do not understand all the implications of a long flight. "Five years ago," says John Charles, a NASA researcher within the Human Research Program, "I had an astronaut on the station saying suddenly," hey, my ability to see has changed. They are 3 months old and cannot read the checklists anymore. "It seems Charles says that all the fluid that moves up increases the intracranial pressure. The fluid pushes back the eyeball and flattens it, "says Charles.

Today the station is equipped with adjustable glasses, so astronauts who do not normally wear glasses, use them if they need it. For those who already wear glasses, additional eyeglasses with stronger prescriptions are brought.

Astronauts need a good view and vision damage during space flight is not a minor problem. NASA knew about the problem several decades ago. "We also saw this on Skylab" - the first space station in the US, which hosted more astronauts for 1-3 months between 1973-1974. Bone mass, muscle mass, blood volume, etc all return to normal for the most part. But astronaut's eyes do not recover completely. Even physicians do not know exactly what would happen during a mission four or five times longer than today.

The station is a permanent outpost, but it is not independent. Those at the Control Center do not wake the astronauts from sleep and the control of the station is from the ground.

Each day begins and ends with a planning conference, during which astronauts check with all five control centers in the world the program grids, maintenance, or what will be done the next day. NASA has a second unit in Huntsville, Alabama, which deals with scientific research. Moscow has a mission control center for half of the Russian station and the European Space Agency and Japan's Space Agency have their own control centers.

Although the station is flying at 27,600 km/h. (10 times faster than a bullet), still can not escape the daily sessions.

Even if astronauts live and work on the station, they do not control the flight. The Houston and Moscow centers are in charge of piloting the station where the mission control center monitors the position and adjusts it as needed using gyroscopes and propulsion engines. The mission control center also monitors all onboard systems - electrical, life support, IT, communications. It takes about 1,000 people on Earth for every astronaut on the orbit. Even after the astronauts finish their workday, those on Earth continue to work shifts 24 hours a day.

Life on the station is managed at a minute. When an astronaut clicks on a time cell, it expands and shows the steps required to perform the specific task.

In its way, the program can be a source of freedom, but it can also be frustrating. Scientific experiments, maintenance tasks, the arrival and departure of the food-bringing vehicle, everything is fixed from the ground. Each astronaut's program has a red line that slowly moves to the laptop screen, from left to right, showing the current time and what it should do at the time.

Life in space is so complicated that 50 employees are only needed to build the program for the American astronauts in orbit. From fun and intellectually challenging tasks (doing research with ground scientists) to boring ones (recording serial numbers of items in the trash before sending them to be burned in the atmosphere) all are part of the daily work of an astronaut in space.

Exit in Space

The costume is not less than 50kg and on Earth, during simulations, 3-4 people are needed. The station is just one. The equipping procedure to get into space has not less than 400 steps.

An extravehicular activity is for almost all astronauts, the greatest challenge. Outside the station, you are an independent astronomical body that orbits 27,600 km/h.

Extravehicular activity is dangerous and shows how dangerous space can be. A single connector could lead to disaster. That's why space drives are simulated on Earth in a swimming pool and are carefully planned.

NASA initially promised that space shuttles will fly at least 25 times a year. In fact, the transfer program had a duration of five flights a year. In the peak year, in 1985, there were 5 flights. President Ronald Reagan, in his 1984 Statement on the Statute of the Union, has commissioned NASA to permanently create and hire a space station that he predicted would allow him to leap into scientific research, communications and drugs that could only be fabricated space-bar. NASA's original vision for the station was as ambitious as Apollo. The station was supposed to have seven main functions: to be a research laboratory, a production unit, an observatory, a space transport center, a satellite repair facility, a spacecraft assembling station and a stationary base for missions in the Solar System.

30 years later, only one of these functions remained: the research lab. And despite Reagan's aspirations, nobody today uses materials or drugs invented on the station. Currently, about 40% of the station's commercial research capacity is not used - most likely because some companies do not know it is available.

NASA has always said that understanding how to live and work in space for long periods of time has been a key goal of the International Space Station. But, from the White House, it may seem expensive this race around the Earth, considering that the mission costs about $ 8 million a day.

Space makes us anxious. We are anxious that things go smoothly as if space flight should be infallible like a flight to London. And we are looking forward to a return on investment.

We fly in space because of human ambition, because nothing gives us more resistance than trying to do what we have not done before. And we're flying in space because space is the eighth continent.

We may eventually need asteroid or lunar resources, depending on how we manage the resources we have here on Earth. Eventually, we should become a species that will conquer other planets, whether we are no longer inside or that we actually destroy it or it will be destroyed.

Conclusion

Life in space is so complicated that 50 employees are only needed to build the program for the American astronauts in orbit. From fun and intellectually challenging tasks (doing research with ground scientists) to boring ones (recording serial numbers of items in the trash before sending them to be burned in the atmosphere) all are part of the daily work of an astronaut in space.

However, it is time to say that the role of the robot in the future is altogether another, namely, to help us conquer the cosmic space to expand ourselves as a race in the whole universe in which we are now. In fact, this is the robot's humanitarian role and in the future, it can be developed and prepared just for that purpose. Exploratory robots are robots that operate in hard-to-reach and dangerous locations, telegraph or partially autonomous. They can work for example in a region in military conflict, on the Moon or on Mars.

A geared navigation on the ground in the last two cases is impossible due to distance. Communication signals arrive at their destination in a matter of hours and their reception lasts as long. In such situations, robots have to be programmed with several types of behavior, from which they choose the most appropriate and execute it. This type of robot equipped with sensors was also used to research pyramid wells. Several cryobots (cryo robots) have already been tested by NASA in Antarctica. This type of robot can reach up to 3,600 m through the ice. Cryobots can thus be used in polar head research on Mars and Europe in the hope of alien living.

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Acknowledgement

This text was acknowledged and appreciated by Dr. Veturia CHIROIU Honorific member of Technical Sciences Academy of Romania (ASTR) PhD supervisor in Mechanical Engineering.

Funding Information

Research contract: 1-Research contract: Contract number 36-5-4D/1986 from 24IV1985, beneficiary CNST RO (Romanian National Center for Science and Technology) Improving dynamic mechanisms.

2-Contract research integration. 19-91-3 from 29.03.1991; Beneficiary: MIS; TOPIC: Research on designing mechanisms with bars, cams and gears, with application in industrial robots.

3-Contract research. GR 69/10.05.2007: NURC in 2762; theme 8: Dynamic analysis of mechanisms and manipulators with bars and gears.

4-Labor contract, no. 35/22.01.2013, the UPB, "Stand for reading performance parameters of kinematics and dynamic mechanisms, using inductive and incremental encoders, to a Mitsubishi Mechatronic System" "PN-II-IN-CI-2012-1-0389".

Ethics

This article is original and contains unpublished material. Authors declare that are not ethical issues and no conflict of interest that may arise after the publication of this manuscript.

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