Industrial Design Role in Creating Daily use Products Inspired by Space Artifacts

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Abstract:
This study aims to discover, clarify and take advantage of the relationship between space artifacts by the human to meet his needs, the industrial design and products that we use in our daily lives, and to develop a strategy of how to simplify and transfer space technology to the Earth. The study has adopted the matter of motivating the designer to identify the nature of the products used by astronauts in their environment and to inspire them to be applied on Earth. This is because the identification of the designer innovations to meet human needs in space significantly contributes in developing, improving and innovating new products that we use in our daily lives. In the mean time, analytical studies showed that an astronaut needs products which satisfy the basic requirements of life such as breathing, nutrition, waste disposal, bathing, sleep, contact with Earth, treatment and entertainment .... etc. If we carefully consider many of the products we use in our daily lives, we will realize that they are non-earth products; i.e. not originally designed for use on Earth, but have been designed to be used by astronauts for live in an environment of zero gravity where most of the traditional living ways are unavailable, Without such products, no astronaut can live in space. If these products satisfy the human needs in cruel environment, rather they will meet his needs on Earth but not with the same level of complexity, On Earth, we do not need the same level of complexity. Instead, we just use the same idea used in space for application to the products that we use in our daily lives on Earth. As for the results on the philosophical side, the study found a solution to the relationship between human and the product in conditions different from the conditions of life on Earth (such as weightlessness, space limitations, no night and day... etc.) and in particular to solve certain problems in usage between human and product (space-time) and inspire those products and take advantage of them in certain areas on Earth.

Keywords
Industrial Design,
Daily Life Products,
Space Artifacts,
Nanotechnology,
Technology Transfer.

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Statement of the Problem:
How to transfer space technology to Earth in order to use it in our daily lives and how to simplify and transfer this technology with applicable scientific steps?
Determining if there is a relationship between space artifacts, the industrial designer and our daily life products

Objective of Study:
Discovering, clarifying and taking advantage of the relationship between human space artifacts to meet his needs, industrial design and products which we use in our daily lives, and to develop a strategy for the transfer and simplification of space technology in preparation for application on Earth.

Significance of Study:
Motivating the designer to identify the nature of the products used by astronauts in their environment and to inspire such products to apply them on Earth, and reaching "methodical" steps for the transfer of space technology to Earth.

Methodology of Study: Inductive Method.

Basic concepts:

First: Industrial Design:
One of the main roles played by the industrial designer is the adaptation of inventions, technologies and materials in the form of products suitable for daily life use by the human. In fact, the designer inspires space artifacts for Earth.

Second: Daily Use Products:
On one hand, the designer innovates products for daily life in the light of science and technology, which products are innovated by the human in academies, research centers and industrial establishments.
On the other hand, science and technologies innovated by human to suit space conditions are a source of ideas for products that can be used on Earth. Such ideas are not often conceived by the designers because Earth's atmosphere does not need these innovations.

Third: Space Artifacts:
The first thing of space-age science that human applied is strengthening "Ergonomics" science with regard to the conditions faced by human in space; mainly, weightlessness.
Thereafter, industrial designer researches were conducted one after another in the field of inspiration of space artifacts.
It is noteworthy that the materials synthesized by "nanotechnology" are deemed to be things that feature the space artifacts which have become

commonly used nowadays in daily life products.
Some ideas were taken from nature as a main source of inspiration for space uses; for example, birds' eyes which have layers to protect them from harmful rays.

Fourth: Nanotechnology:

Extremely small molecules technology or Nanotechnology is the science that studies the manipulation of matter on an atomic and molecular scale.
Nanotechnology is concerned with inventing new technologies and methods whose dimensions are measured by nanometer which is one part of thousandth of a micrometer; i.e. one part of millionth of a millimeter.
Usually, nanotechnology deals with measurements from 0,1 to 100 nanometers; that is to say, with atomic concentrations between five to one thousand atoms. These dimensions are much less than bacteria and living cell dimensions.
So far, this technology is not concerned with biology; instead, it has to do with the properties of materials. Its areas are widely range from semiconductors to completely modern methods dependent on molecular self-assembly, and this measurement is compared to the widening in the nature of the materials used. Nanotechnology deals with any phenomena or structures on the nano small level.
Through nanotechnology it is possible to make an atom-sized spaceship that can navigate in the human body to perform surgery.
This technology enables us also to make an insect-sized car, a mosquito-sized plane, dust repellent glass, heat conductive glass as well as water-proof fabrics that are not permeated by water while at the same time allows sweat to go out easily.
(https://en.wikipedia.org/wiki/Nanotechnology)

Fifth: Technology Transfer:

Transfer of technology is the process of transferring methodical knowledge necessary to manufacture a certain commodity or product, to apply a means or to perform a service including management and marketing technology, transfer of knowledge and technology mechanisms; i.e. it is a process of cultural transfer of knowledge from the developed countries to developing countries. It must be noted that technology is characterized by social and economic nature, and changes depending on the community's change, development and cultural progress. Technology emerges according to the conditions of environment; consequently, its change is dependent on the community's requirements and capabilities. Technology embodies each community's spirit and identity and its style of progress where it is observable because the transfer of technology means the transfer of scientific knowledge. (Fayyad Abdullah 2010)

Theoretical Framework:

The current study focused on two themes to achieve its objective.
The **first** theme included the designer space artifacts through giving examples of these artifacts, while the **second** theme dealt with how to apply these artifacts and technology on Earth.
In the following lines we will encounter a set of examples in the form of Case Studies to prove that space artifacts were and still a source of inspiration of human artifacts used in everyday life on Earth; for example:

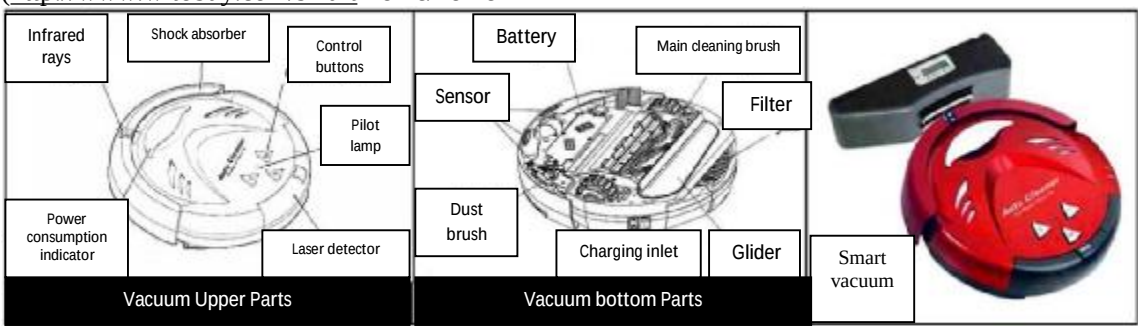
Robots:

Space agencies are doing experiments in order to depend wholly on the robots in some missions in space so as to prevent human intervention in such missions except for remote monitoring and modification. Robots operate in hard conditions that are unbearable by human or perform dangerous missions. These robots have remote sensors, cameras and laser scanners for different missions of planetary, soil and rock exploration ....etc (Figure1) (https://en.wikipedia.org/wiki/NASA_robots).

(Figure 1) Space Robots

Space artifacts had passed to Earth and there were invented products that operate with the same technology; for example, "smart vacuum" which is the latest invention in the world of vacuum cleaners. It is not a vacuum but a "robot" with a very small size compared to the ordinary vacuum cleaners and operates with one press on the button of remote control, and when the battery turns empty it automatically directs itself to the charger place for charging.

This vacuum operates with a remote sensing system as in modern cars to calculate distances and not to collide with anything. (Figure 2) (http://www.witobuy.com/smart-home/home-cleaning/kv8-m-288-new-multifunctional-cleaning-robot-intelligent-smart-vacuum-cleaner.html)



(Figure 2) smart vacuum with bottom and upper parts

Results:

The study was based on a comparison between space artifacts and the earthly products inspired by such artifacts, which found the following results:

1- Solving some of the problems encountered by the human when using a product in conditions different from living conditions on Earth in (space-time).
2- Attention must be paid by the designer to "nanotechnology" due to its big influence on the development of product raw materials.
3- Identifying the designer's artifacts to meet the human needs in space significantly contributes to inventing of new products for use in our daily lives.
4- Discovering the relationship between space artifacts, the industrial designer and our daily lives' products.
5- Developing a strategy to simplify and transfer space technology to Earth.

Discussion:

The discussion aims to explain the significance of the results found and to clarify the study addition in the field of industrial design since no studies or theses have tackled this topic yet.

1- Solving some of the problems encountered by the human when using a product in space in (space-time) makes it easy for the designer to solve these problems on earth; for example, the issue of astronaut's exposure to extreme pressure and temperature and lack of oxygen necessary for breathing in space prompted the designer to invent the space suit. Hence, it was easy for the designer to make a suit for firefighters on Earth with the same features. In other words, artifacts designed for the hard conditions in space are easy to be designed for lighter conditions.
2- Industrial designer's concern with "nanotechnology" has a big influence on the development of product raw materials as well as product characteristics, improves the functionality of these products and allows new moulds to satisfy the designer's imagination, excite and attract the user. It is necessary to keep up with the time developments and use entirely new and synthetic materials.
3- Directing the industrial designers thought and attention to a technology that they may neglected or had not have concern on; i.e. "space technology," because many products that we use in our daily life on Earth were originally inspired by space.
4- Encouraging designer to search and learn about the history and conditions of the invention of many products which was originally designed for solving a certain problem.
5- Proposing a "linear strategy" to simplify and transfer space technology to the Earth. This strategy is a series of logical sequential stages, where each stage depends on the output of the previous one. Of course, there are branching, annular, adaptability and complementary strategies, but the " linear strategy " is the simplest one which is outlined in the following points:

5-1- Scientific Research Funding and Support:

A budget must be allocated to support research and development, and specialist scientists and researchers should be attracted to localize and develop the technology to match the projects' requirements, on the other side, universities, enterprises and research centers must be funded whether by government or other countries and adapted to work in space researches. This idea is applied in field; for example; Assembly, Integration and Test (AIT) Center for satellites, that was established in Egypt in 2015 with fund from a Chinese subsidy to Egypt. It is a center for design, assembly and testing of satellites between the Egyptian Ministry of Scientific Research and the Chinese Ministry of Science and Technology. Other examples are available in several countries.

In 1960, Egypt reached to the manufacture of jet

engine of the plane named "Cairo 200" or "200 e". This was announced by the late president Jamal Abdel Nasser in July 9, 1960 in cooperation with and finance from India and Germany. (Mohammed Bahai Eldin 1996)

5 -2- Granting and Protection:

University students and graduates should be given opportunities to cooperate and work with the space agencies through cooperation protocols with agency intellectual property protection under the laws governing the two parties. In Jordan, four students from Jordanian universities implemented a project special for communications in the American space station; NASA. There, students were trained to develop the navigation system and locate sites.

5 -3- Action Strategy:

Selection of whatever suitable of space technology to be transferred to Earth since it is a complex technology and not wholly applicable on Earth as it is because it was designed for hard conditions; instead, these products are designed for conditions where there is no life. In this regard, we rely on "simplification."; for example, is we ask: Do we need a rocket engine for a passenger plane?, the answer will be that the rocket engine speed reaches to 35,000 kilometers per hour while the maximum speed of the jet plane is up to 3,500 kilometers per hour. Then, the question is Do we need such excessive technology for use on Earth? Of course, No., and that is the technology selection.

5 - 4 –Circulation:

Not all kinds of technology can be circulated; for example, "microwave rays" which are a part of electromagnetic rays with long wavelength measured in the range of 0.3 to 30 centimeters. These rays are normally emitted when an electric current passes through a conductor, and they are similar to the waves of television, radio and mobile phone. They are used for several purposes; such as cooking by what is called microwave oven, in addition to uses in communication and information transfer and remote sensing devices and radars. Hence, its use in cooking is only a simple process of their several practical applications. This kind is somewhat safe and can be circulated.

However, there are microwave rays that can not be circulated whose range is between 0.3 to 60 centimeters. These rays are used in the US Navy for they have the characteristic of vaporizing water molecules from any living organism in a matter of minutes but very dangerous. They are also used to break up demonstrations by the US Army.

Then, not all kinds of technology can be circulated; the matter that requires obtaining a license for the safe technology from space agencies and government.

5 -5- Circulation Laws

Laws must be enacted to govern technology circulation so as not to be abused and turned into a source of harm for us. In this regard, standards and controls should be set via examining those companies and sectors that will adopt the process of simplification and transfer of technology through monitoring.

5 -6 - Monitoring

Monitoring and control of such companies or entities responsible for gradual implementation of those ideas "technology" in the form of products in order to control the method of technology in compliance with the agreed laws

5 -7- Samples

There must be made real trial samples of those products where space technology is used to offer them in the markets with a view to test the products in many aspects, such as the extent to which this technology achieves success in the market, determining the percentage of customer satisfaction and the exclusive benefit of such products. An example of this is "LED" technology in screens. "LCD" and "LED" screen technology has first emerged in space since it has more advantages such as small size and light weight than other technologies, and when this technology was transferred to Earth in computer screens and other products it satisfied user and achieved great success thanks to the more advantages they have than the precedent technology called CRT.

5 -8-Technology Generalization:

After checking the safety degree of the technology used and ensuring that the authorities concerned with industrialization comply with the laws and requirements of circulation under agreements between the parties, then technology can be generalized after performing all use and market tests while maintaining the intellectual property of space institutions.

Conclusion:

First: Industrial designer must be concerned with the technology that he may neglected i.e. "space technology", because many of the products that we use in our daily lives on Earth were first inspired by space. The designer should also be encouraged to search and learn about the history and conditions of the invention of many products which were originally designed to solve a certain problem *(Finding physic correct solutions for physic construction). (Mohammed Ezzat Saad 1985)*

Second: To transfer any technology from a developed country to a developing country. We must follow "strategic" methods; to wit:

Allocating a budget for support of research and development, and attracting specialist scientists

and researchers to localize and develop technology to match the projects' requirements. Consequently, establishing a scientific base and local technical infrastructure determining the kinds of transferable technology by means of modernizing, developing and upgrading education system in order to achieve a breakthrough in the curricula and teaching methods which contributes to the preparation of new generations of scientists and researchers able to deal efficiently with the developments of science and technology

Thereafter, there should be prepared an industrial generation that will bear their own community's industrial responsibilities of operation, production, maintenance, marketing and development through training and optimal investment of local human resources, and taking the advantage of high efficiency local cadres of engineers, scientists and technicians to find and adapt proper techniques to become more convenient to the environment that they were brought to.

Conferences and scientific forums must be organized and applied research conducted to remove the obstacles which prevent the optimal transfer of technologies and industrial development.

Foreign direct or joint investment should be encouraged to take advantage of the methods of administrative technical knowledge set by the foreign partner and helps to gain experience in the future.

National statutes and regulations should be set to limit the abusive conditions imposed by the developed countries in getting the technology.

Finding incentives to limit the migration of qualified scientists and technicians having qualifications and experiences in technology.

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