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FULL PAPERS

Robophilia and *Device Art* in Japan

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Abstract

Japan has always exhibited a unique form of what can be described as robophilia. [1]

The peculiar characteristics of artistic creation in Japan and some Asian countries, in industrial developments in the field of engineering, computing, AI and robotics, and the existence of a culture of manga together with the idea of construction of prototypes from a certain artistic-commercial approach, raise the need to deal in depth with the development of robotic art in Japan, especially as a historical reference and as a vision of the future.

The permeability between art and design, so complexly posited in the West, does not suffer that categorical distinction in Japan, where the concept of Device Art opens the possibilities of aesthetic experimentation with new technologies towards industrial productions and, therefore, its approach to a public wider.

Keywords

Robotic Art, Technology, AI, Karakuri, Device Art, New Media Art

Introduction

The current Japanese revolution in industrial, social, and service robotics; the different anthropomorphic developments: assistance dolls, hostesses, dancers, and concert performers, etc., are well known due to their constant appearances in all the media. But the situation in which we find ourselves today is a reflection of the natural evolution produced in the world of automata since the middle of the 16th century. Historically, the concept of Japanese 'Art' (*Gei*) has a more transcendental and introspective sense, of interrelation between the individual and nature. It ranges from the most elaborate representations and objects to the simplest and most everyday actions. The principles of tranquility and calm achieved in the contemplative processes and in the performance of simple rituals such as, for example, the tea ceremony, the Geisha ritual (whose literal translation could be "performance artist") or the care and bonsai cultivation.

Japanese aesthetics, mediated by its philosophy and religion, seeks to find the meaning of life through art: beauty equals harmonious creativity. The realization of the work is presented as a poetic impulse, an almost spiritual

path, which has no purpose in itself. Beauty as an ontological category refers to the existence of all things: it consists in reaching the unitary sense with the rest of the material and immaterial world. It does not focus exclusively on the sensible qualities (in the external determinations of objects) but rather seeks an implicit communication with them. That is why oriental art is based mainly on suggestive qualities. It should not be perfect, but rather express a quality that leads to totality. It is intended to capture the essential through the part, which suggests the whole: the void is a complement to what exists. The radical separation between Art (with capital letters) and crafts, present in Western culture is not acceptable, because art and crafts are configured by the same spiritual substance.

The Edo Period and *Karakuri*

Around 1.600 the Edo period begins. It corresponds to the end of a period of fratricidal wars between the different clans of power: the imperial, the one formed by the regents (*shogun*), the feudal lords (*daimyō*) and the samurai warriors and gives way to the unification of Japan under the command of the Shogunate Tokugawa. Faced with commercial abuses by Westerners and the invasion of strongly proselytizing missionary congregations, the Tokugawa clan decided to impose strict control over the internal political structure (*sakoku*). All power is centralized in the city of Tokyo, the capital of the East, and any influence that comes from abroad is eliminated with the closing of the borders. This situation continued until 1868, when the Imperial Era began. A period of stability develops that will last 250 years.

During this stage of isolation, Japanese artisan technicians begin to develop their own technology, initially influenced by the Western one. They will have to refine the mechanisms to suit their culture: clocks (*wadokei*) must conform to the traditional Japanese division of time, where day and night were separated into six segments named after animals. The complexity of dividing and controlling the time segments, moreover, when they were not all the same, produced different and complex techniques and a very advanced development of the manufacturing and control of the gears. Quickly, this knowledge began to be used in the creation of different wooden automatons, the so-called *Karakuri*¹, which could be translated as 'mechanical devices to produce surprise in a person'. Its objective is the reproduction of

¹ Detailed information about *karakuri*. Accessed October 26, 2021, <http://www.karakuri.info>

daily actions within Japanese social life: religious or private rituals, theatricalization of historical events, indigenous dances, etc. According to its operation, a division was established into three large groups:

— *Butai Karakuri*, almost life-size, were used in the theater to stage historical events or ancient traditions, accompanying the actors in the representations. In 1662, the mechanic and watch and puppet specialist Takeda Omi opened the Takeda-Za Theater in Osaka as a space for experimental performance. The works of flesh and blood actors were combined with elaborate puppets and multiple automatons. Its great success with audiences throughout the country contributed to the development of the *Butai Karakuri* and the creation of numerous theaters with mechanical puppets.

— *Zashiki Karakuri* are smaller. Considered a luxury product by the feudal lords of the Edo Period, they are intended for the private and intimate space of the home. They perform actions that represent common life, such as serving, writing, playing an instrument, shooting arrows, etc. The best known are: the *ChaHakobi Ningyo* (figure 1), a semi-automatic servant who served tea to the feudal lord's guests, and the *Yumihiki Doji*, a dart-throwing archer. The operation of the first is both very simple and of great mechanical complexity. The counterweight of a cup of tea placed on a tray on his arms caused a movement of movement forward until he reached the guest, who when taking the cup of tea, stopped the mechanism. Once the liquid was consumed, when placing the cup back on the tray, its weight (in this case, less when it was empty) set the mechanism in motion again, but on another "programming": turn around to face the man. from the house and then walk towards him.



Figure 1. *ChaHakobi Ningyo*. © GFDL. British Museum

The original designs of its mechanism and construction have survived to this day thanks to the *Karakuri Zui Anthology* made by the great inventor, artist and engineer Hosokawa Honz Yorinao (1741-1796). The three-volume work also shows the designs and mechanisms of four kinds of watches (*wadokei*) and eight *Karakuri* models. The archer created by inventor Hisashige Tanaka, in the late Edo period, is able to take an arrow from his quiver, place it on his small bow, and shoot it at a target. Tanaka is known as the "Japanese Thomas Edison", due to his many mechanical inventions, among which is a scribe who could draw Japanese characters. He contributed to the modernization of Japan by founding the telegraph company, developing Morse technology and the first telephones. His company will become today's Toshiba Electronics Corporation.

— *Dashi Karakuri* are large, luxuriously decorated wooden structures. They have three floors, with a small stage on each one. In the upper part, two or three automatons represent traditional legends or Japanese mythical tales, in the second a group of dolls acts as a

'choir' and in the lower part a group of musicians play the flute and drums as accompaniment. During religious festivities and ceremonies, the *Dashi Karakuri* were carried in procession. The tradition continues to this day in different events in Japan such as the Inuyama Festival, the Nagoya Festival, the Takayama Festival, the Gion Festival and, one of the most recognized, the Kamezaki Shiohi Festival.

In the different constructions of *Karakuri* we find the first peaceful (social) developments of interaction between automata and human beings. While the Western imaginary has been populated by servile, mechanical, almost monstrous beings who could escape the control of their creator to sow chaos and destruction, in the East a close relationship of trust is established, of belonging to the family and to the intimate and own world.

"The automaton puppet was a prototype of the robot that is said to be flourishing in industrial Japan today. In a sense, we can say that the Japanese learnt to tame the machine by means of the *kadakuri* puppet because they considered the puppet an extension and copy of the human figure, not as something sent by demons or animated by the divine. In a society where mechanical figures are thought to be pure material, people are always potentially suspicious that they may go beyond human control. [...] As playthings, the puppets did not threaten human competence or existence, they remained charming copies of the human figure. They were considered in a way like domestic animals." [2]

Another fundamental aspect that differentiates both worlds, and that is shown in a specific way in the sphere of art, as Machiko Kusahara will later propose, is an intense desire to fascinate, entertain, amuse and surprise with these creations, as opposed to theorizing technological and intellectual of the West.

After the success in 1924 at the *Tsukiji Little Theater* in Tokyo of the play *R.U.R. Rossum's Universal Robots* by the author Karel Čapek, where the word "robot" appears for the first time, begins the development of current Japanese robotics, from a more "humanistic" perspective in contact with Nature. The first modern Japanese robot, heir to the *Karakuri*, was built in 1928 by the biologist Makoto Nishimura for the public coronation festival of Emperor Hirohito. Baptized as *Gakutensoku* which means "learning from natural laws." He represents a human figure with golden skin, kind-looking and seated at an altar-desk. At more than 3.2 meters high, he had a complex compressed air system that allowed him to open and close his eyes, move his head, modify the features of his face outlining a smile, "breathe" and write. The image of *Gakutensoku* is closer to the representation of a great Buddha, than to the classic Western model of an aggressive metal robot. In 2008 it has been restored for the Science Museum in Osaka with a computer system that controls all its movements.

***Tetsuwan Atomu* and the 'Mechas'**

Starting in 1930, the figure of the robot began to be common in comic strips, popular stories, songs, business

developments and political documents. He was usually depicted as a nice, slim "man" who can communicate with people and especially with children. The stories of the father of Japanese science fiction, Juza Unno, about automatic machines will directly influence the creator of Astroboy. We cannot really talk about Japanese robotics, or understand its conceptual, industrial and artistic development without making a small note about the evolution of the concept of robot within popular manga culture.

The first manga representation of a robot corresponds to a little boy who learns, has his own will and wants to be the closest thing to a human, a kind of robotic Pinocchio. *Tetsuwan Atomu*, better known in the West as *Atom* or *Astroboy*, is considered the first manga to have a robot as its main character. Its creator Osamu Tezuka, currently considered the god of manga, studied medicine before dedicating himself to the world of graphic drawing and comics. Influenced by the aesthetics and dynamics of Walt Disney's animated films, his goal was to transfer that energy, mobility, and simplicity of lines to drawn comics. At first, he made different comics in which he tried a revolutionary form of quick cuts between the panels, which served to show dramatic close-ups and mix them with large wide shots. In 1951 the first comic of *Tetsuwan Atomu* appeared in *Shonen Magazine*: a humanized robot that helps the earth in an atomic conflict with an extraterrestrial civilization. In a later issue of the magazine, his birth is narrated: Doctor Tenma, a scientist from the Japanese Institute of Sciences, has created the robot in the image and likeness of his son, who died in an accident. It is a robot with a child's body and human feelings. It has artificial intelligence, X-ray sight, super-hearing, rockets in its boots and arms and, most importantly, a unique nuclear heart-reactor. In the development of his *Tetsuwan Atomu* saga, Tezuka shows his concern about the possibilities of the interaction between machines and human subjects, the pros and cons for the good of humanity, developing ideas and concepts extremely close to those proposed by Isaac Asimov in his Three Laws of Robotics.

Unlike what happens in many of Asimov's stories, Tezuka's robotic characters do not try to find ways to "break" the rules, but rather their robots have intellectual and moral free will, a condition that Asimovian characters do not have. Tezuka did not formulate any proper laws but established simple common sense ethical rules to govern the coexistence between robots and humans. "To put it simply, the difference between *Mighty Atom* and *Terminator* shows the differences between how Japanese and Westerners view robots. Westerners tend to have this sense of alarm or wariness. Japanese are unique in the world for their strong love and affinity for robots." [3] In addition to being a Manga hero, Atomu, whose name recalls Japan's traumatic experience with the atomic bomb, became Japan's Son, an ideal reflection for many families who lost their children in war, and a national icon, a symbol of scientific progress: "a peaceful future, where Japanese science and technology were advanced, and nuclear power was used for peaceful purposes." [4]

In 1956, at the age of 21, Mitsuteru Yokoyama published his science fiction manga *Tetsujin 28-go* in *Shonen Magazine*, known outside of Japan as *Ironman 28* or *Gigantor*. The robot's movement and actions are remotely controlled by the young Shotaro Kinta. "Aton and Iron Man are the ancestors of all subsequent Japanese fantasy robots, particularly two distinct genres seen today: truly autonomous robots and those that require human intervention for their operation." [5] He is the forerunner of the Mechas genre² (abbreviation of the Japanese *Meka* for the English word mechanical), a specialty of Mangas that exhibit robots, generally of great size and thought as defensive weapons to protect humanity, which are physically controlled by a human subject. A mecha can have a humanoid or zoomorphic appearance, be a kind of means of transport, a form of mobile weapon. Likewise, there are "fused" wicks, a variety of relatively smaller wicks that are assembled into a larger one or that can undergo transformations from one shape to another, to increase their deterrent power.

This genre quickly jumped into the realm of animation (Anime): cartoons for TV. From 1972 until today, more than thirty different series of Mechas have been created and reissued. The best known are: *Code Geass*, *Yatterman*, *Brain Powerd*, *Mobile Suit Gundam*, *Bokurano*, *Macross*, *Robotech*, *Super Sentai*, *Full Metal Panic!*, *Eureka 7*, *Daitarn 3*, *Martian Successor Nadesico*, *Burst Angel*, *Zoids*, *Neon Genesis Evangelion*, *Transformers* and, of course, the most famous of all *Mazinger Z*. The stereotype of the mecha pilot is a young, brave and active character. Normally the protagonist suffers an accidental encounter with his fuse or is a close relative of the creator who dies killed by enemies and before dying reveals the secret of the robot's construction. In 2013 (and the sequels) the Mecha anime genre received a western homage with the film *Pacific Rim* directed by Guillermo del Toro.

Mazinger Z (1970) by Go Nagai begins the saga of the Japanese super robot, with bright and primary colors, a mix between military equipment and samurai armor. For the first time, an integration between the machine and the individual is proposed. In the words of its author: "I wanted to create something different, and I thought it would be interesting to have a robot that you could drive, like a car." [6] The robot's brain is not a complex program, but a human being, the young orphan Koji Kabuto. Some researchers have pointed out a certain psychological problem within Japanese manga due to the continuous idealized representation of the image of the father; for the ever present initial conflict; by rejection of the individual in front of the machine, to end up assuming the role of hero; by the sublimation of the feminine; by the metaphorical use of the Great Robot (Meka-Corpo-Man) in front of the symbol of the Great Mother Earth and, finally, by the use of young adolescents as inexperienced or fusionable controllers with machines.

In 1979, the so-called realist school (*riaru-ha*) began with one of the anime that has most influenced the current Japanese youth culture and society: *Mobile Suit Gundam*³

² *Robot anime history* accessed October 26, 2021, <http://www.youtube.com/watch?v=KxntzjOvo8Q&feature=channel>

³ *Mobile Suit Gundam* accessed October 26, 2021, <http://www.gundamofficial.com/features/introduction.html>

by Yoshiyuki Tomino. The action is set in outer space, the manichean struggle between Good and Evil of the previous era evolves towards more complex and conflictive characters and characters. The robots are presented as combat suits-spaceships. At this point we can speak of exoskeletons, of giant structures that are driven and controlled by intrepid young men and fighters. The next step in evolution occurs in 1995 with *Neon Genesis Evangelion*.⁴ It shows the "existential union" between mechanical structures and their pilots: a new relationship between the organic and the inorganic, a relationship that in many cases becomes symbiotic and not exclusively due to proximity, continuity or mixture. Robots are losing their machine appearance, to become more and more evolutionary developments of the human subject

The evolution of robotic manga in Japanese culture, and by contagion in Western culture, is increasingly considered as a form of visual prediction of what is going to happen, or can happen in the future, a kind of Science Fiction in drawings, but at the same time it appears as a source of inspiration in the work of researchers and scientists. *Tetsuwan Atomu*, the robot child, reminds us of the legion of anthropomorphic robots born in the great Japanese industrial corporations: *Asimo* (Honda), *Qrio* (Sony), *Partner Robot* (Toyota), *Hoap 3* (Fujitsu), etc. *Doraemon*, without a doubt, could be a reflection, a little deformed, of the dogs *Aibo* (Sony), or the therapeutic seal *Paro*⁵. The different types of mechas have been transformed into sumo wrestling robots: *KHRI* (Kondo Kagaku), *Robofire*, *Chroino*, or in the robot Samurai *Kiyomori*⁶, developed by Waseda University and the Tmsuk company, and the evolved mechanical beings of *Neon Genesis Evangelion* in the humanoids of the engineer and professor Hiroshi Ishiguro. As Mark Gilson indicates "where will the future concepts in robotics come from? Keep watching the cartoons." [8]

Device Art for everyone

The curator Machiko Kusahara, in her article *Device Art: a New Form of Media Art from a Japanese Perspective*, introduces a new conceptual construction to redefine what we understand by interactive art, by media art, or by art and new media from a Japanese aesthetic. The new terminology used is *Device Art* "a form of media art that integrates art and technology as well as design, entertainment, and popular culture. Instead of regarding technology as a mere tool serving the art, as it is commonly seen, we propose a model in which technology is at the core of artworks." [9]

This definition is applied mainly to work carried out in Japan, but it can be extended to some countries in the rest of Asia, whose cultural and business traditions are different from the western one. The processes of interaction with the public are linked to new playful forms of entertainment. The creation of the artistic work may be accompanied by a parallel or subsequent commercial development. The union between art and "commercial" is not seen in such a negative way as it is

in the West. Japanese artists are interested in a "popular interactive art", if we can define it that way, and therefore expand its expansion beyond the usual exclusive circuits of galleries, museums and large exhibitions. This central point in their projects allows greater collaboration between artists, scientists, research centers and companies.

The western artistic community sometimes does not understand some of these premises, mainly the idea that art must be both entertainments, or it can be commercial. "Works that are highly appreciated in Japan are often criticized by Western art community for their lack of seriousness. These criticisms are often related to the entertainment factor in the works and their affirmative attitude towards technology." [10] The questions that Japanese critics and curators are asking are: Can artists present their work as software that runs on a popular gaming platform like Nintendo and still be considered art? Are the artistic pieces of the same quality, despite not being exhibited in spaces such as galleries or museums? Can they continue to be considered art despite not being in the "art market"? and your answer is: yes, yes, yes, of course. The distinction between the notion of Fine Arts, understood as the creation of a "Art PURE" and that of applied arts or "crafts" does not exist. Despite the Western desecration of Art, the loss of the aura of the unique and exclusive piece produced at the time of its technical reproducibility and the advances of the conceptual avant-gardes that have stopped placing the accent on the physical object itself to transferring the artistic experience to communication with the subject, in the West we still move on deep classical philosophical and aesthetic principles.

The term *device object*, which originally only refers to the tool with which a job is executed, has become a fundamental element in the realization of the new interactive robotics. The user's experiential level increases exponentially compared to the different uses of sensors, programming, materials, computers, cameras, connections ... in such a way that the device has become the body, the material of the piece, which produces a concrete experience and in its multiplication we can multiply the experience. In Japanese culture, it could be problematic to look for a separation between the tool and the sensation produced, when this has been precisely produced by a certain tool.

The importance of the concept and development of *Device Art* is confirmed by the Doctorate program Empowerment Informatics at Tsukuba University directed since 2014 by Professor Hiroo Iwata. Iwata himself provides a succinct and appropriate definition of the concept:

- (1) The device itself is content. The mechanism represents the theme of the piece. Content and tool are no longer separable.

⁴ *Neon Genesis Evangelion* accessed October 26, 2021, [http://en.wikipedia.org/wiki/Neon_Genesis_Evangelion_\(anime\)](http://en.wikipedia.org/wiki/Neon_Genesis_Evangelion_(anime))

⁵ *Paro. Therapeutic Robot* accessed October 26, 2021, <http://www.parorobots.com/>

⁶ *Samurai Kiyomori*. accessed October 26, 2021, <http://www.kiyomori.jp>

(2) Artworks are often playful and can sometimes be commercialized into devices or gadgets for use in everyday life.

(3) Refined design and playful features are traced back to the Japanese tradition of appreciating tools and materials. Traditional Japanese culture, such as the tea ceremony or flower arranging, uses sophisticated devices. These devices are the roots of device art. [11]

Maywa Denki is the best example of serial device artistic production. The artist Nobumichi Tosa (<http://www.maywadenki.com>) defines it as an *art unit*, which could be freely translated as “productive unit of art”. It works like an artistic company, a metaphorical imitation of his father's old electronics company, from which he takes his name (Maywa Denki). The conceptual approach, in an ironic and playful way, is closer to business standards than to artistic ones. Nobumichi Tosa (fiand all of his collaborators, whom he calls employees, wear a suit designed like the typical uniform of Japanese electrical shop workers in the late 1960s. These types of stores represent the small and medium-sized business that helped the Japanese economy grow after World War II, something like the Japanese version of the American dream.



Figure 2. Nobumichi Tosa.
©Ricardo Iglesias

The philosophy of his work is based on concepts 'copied' from the business world. Each piece created at *Maywa Denki* (figure 2) appears with the denominator of "product": a mixture of high-tech and low-tech that provides a unique visual aesthetic form. Recycled elements from old machines are reused in the creation of new parts with advanced programming. His live performances are called "product presentation". Each "product" is understood as a unique prototype within the production chain, representing the peak of a pyramid where the lower levels are industrial optimizations of the original developments, presented as objects for commercial sale with the motto: no product sales but secondary use profit. The “art production unit” that includes all kinds of mechanical, robotic, electronic, automaton, puppet and musical instrument gadgets, more or less controlled, has been divided into three production lines:

— *NAKI*, a series of mechanical objects and musical machines inspired by the skeleton of fish or some other characteristic of its own, such as the bidirectional eyes of

the *Oo-No-Me*, the *Na-Tate-Gato* electronic harp whose strings resemble thorns, the xylophone *Hou-Den-Na* with fish body, etc.

— *Tsukuba* (gadgets) is made up of recycled objects into original musical instruments, automatic puppets, modified guitars with remote control, etc.

— *Edelweiss* composed of different objects that suggest artistic and floral motifs. In operation for several years, it has now evolved into a more “classic” line: *Arclassy*.

Visually all the 'products' seem technologically very complicated, but one of the objectives of the company is that their operation is completely intuitive.

In 2004, the NTT-ICC Inter Communication Center in Tokyo organized the retrospective *Maywa Denki. The nonsencemachines*⁷ with more than three hundred objects distributed in ten spaces. The performance shows or “product presentations” are authentic robotic-mechanical-musician-visual paraphernalia, where the 'non-functioning' of the instruments is considered as one more variable element of the show. This fact allows Tosa to introduce a subtle critique of the industry (art industry) that considers the user (or the art viewer, if we continue with the analogy) as a technological illiterate, as an uneducated and simple recipient of mechanical objects (artistic) manufactured. Its intention is to directly show the product to its audience from two premises: maximum transparency of its operation and have fun together. A direct rejection of technological and intellectual curatorships, like “black box”.

As confirmation of the concepts exposed by the curator Kusahara, Tosa has developed a playful line of *toys*, where he applies the knowledge acquired and the techniques developed in the elaboration of *Maywa* objects to different series such as *KnockMan Family*, a set of small human figures who “play” music to the beat of their hearts; *Nao-Cord Series* - herringbone-shaped electric extension cords; *BitMan Series* small screens showing *BitMan* dancing; *Savao Series* show souvenirs etc. It is interesting, and it may seem paradoxical, to see how in any large electronic supermarket in Tokyo you can find some of Nobumichi Tosa's devices among hundreds of other commercial products and at the same time contemplate them inside urns with safety glass and control guards in major exhibitions such as the MuseumsQuartier in Vienna (2009): *Japan Media Art Festival*.

While Tosa's work exudes optimism, good humor and a certain technophilia, the artist Kenji Yanobe (<http://www.yanobe.com>) bases his work on a direct critique of an idealized approach to atomic energy, the uncontrolled influence of technological development in today's society and the ruins and waste generated by that same technology once it is obsolete. The negative experience produced before the abandoned spaces of the Japan World Exposition in 1970, as if it were a trip to an abandoned future full of rubble, marked his work from the beginning. The EXPO'70 in Osaka, as it is known, with more than 64 million visitors, consisted of a sample of all kinds of technological advances: innovative contributions to architecture and coexistence, sophisticated comprehensive communications systems,

⁷ *Maywa Denki. The nonsencemachines*. ICC. accessed October 26, 2021,

<https://www.ntticc.or.jp/en/exhibitions/2004/maywa-denki-the-nonsencemachines/>

new forms of transport and infrastructures, spaces multinteractivos, etc., (remember the participation of the two immersive American Pavilions). The EXPO'70 represented the "city of the future" (*miari no toshi*), from the infinite and peaceful possibilities of atomic energy. A year later, when the young Yanobe traveled it daily with his bicycle, there were only abandoned remains, the "ruins of the future" (*mirai no haikyo*).

His first pieces correspond to robotic sculptures that can be moved and controlled from the inside by a person, such as mechanical suits dressed by operator-pilots like those that appear in the manga *Mobile Suit Gundam*, but that function as a protective armor against an external attack or a nuclear disaster. *Tanking Machine* (1990) consists of a tank with physiological sodium chloride solution that is heated to the temperature of the human body that floats inside it, in a state of sensory deprivation. Covered with steel and lead plates, *Yellow Suit* (1991) is an atomic radiation protective equipment-suit built in the immediate aftermath of the Mihama nuclear catastrophe. The piece is accompanied by a counterweight that corresponds to an oxygen container, and also includes a version for dogs and a geiger counter. *Foot Soldier-Godzilla* (1991) is a platform that moves in the shape of godzilla feet. A "soldier" sitting on his top can control and direct his movements. movimientos.

In the following years, Yanobe built a whole series of vehicles and machinery with a strong post-apocalyptic aesthetic and a function that was both protective and intimidating. The manga figure Tetsuwan Atomu of Tezuka is a fundamental part of his aesthetic. It is used as a base concept in its criticism of idealism and the naive simplicity of the atomic-pacifist approach represented by the manga itself and assumed by Japanese society in a dogmatic and blind way. "In his reinterpretation of appearance and performance, Yanobe questions apparent innocence of robot's human-like appearance because it provides a kind of concealment or 'protection suit' to ward off criticism of the development of advanced technology." [12] *Atom Suit* (1997) is a yellow anti-radiation suit with lights, lead shields and a geiger counter. The spiky hairs of *Tetsuwan Atomu* are incorporated into the head. In 1997 he began his *Atom Suit Project*, which consists of a visit to different spaces: radioactive (Chernovyl, 1997), desert (1998) or abandoned (EXPO'70, 1998), dressed in the *Atom Suit* and for which he has developed other pieces as special vehicles and accessories.

Giant Torayan (2005) it is one of his best-known works. A child-robotic doll of more than 7 meters in height that sings, dances moving its arms and throws huge flames of fire, while it moves on a large mobile platform. The giant only reacts to orders given by children thanks to a control device, which uses an advanced voice recognition system to differentiate the tone of an adult from that of a child. The system has been developed by the Nagoya Institute of Technology. Despite the most critical aspects of him, he maintains a playful dynamic in his latest works, an approach between the world of children and technology. With the *Torayan series* (2004) he has developed, in the same way as Tosa, a whole commercial line of ventriloquist dolls dressed as *Atom Suit*, where he mixes infantile naivety and the

problems of the adult world (*mini Torayan, Torayan Head, Villa Torayan, Torayan Mask ...*).

With the same ironic-critical approach, the artist Momoyo Torimitsu also raises her different aesthetic productions (<http://www.momoyotorimitsu.com>). The piece *Miyata Jiro* (2001) is a robotic mechanism that represents, in a hyper-realistic way, the typical Japanese businessman crawling like a soldier through the streets of the main financial districts of cities such as New York, London, Paris, Amsterdam, Sydney and Rio. of Janeiro. Torimitsu, dressed as a nurse, walks behind him to meet her needs or show him the right way, change the battery, which she has curiously placed in the lower part of her back. "A satirical commentary on the humiliating conformity of Japanese 'salaryman' culture, the robot presents a cowed and hyperrealistic counterpoint to the camp heroic excesses of many robot performances." [13] In the 1960s, Japan entered a wild era of industrial and economic growth (*Japanese Miracle*) that involved the transformation of traditional oriental cultural parameters into a businessman culture, a business culture that will be characterized by new forms of entertainment. (TV, cinema and karaoke) and the compartmentalisation of physical spaces for entertainment and sex.

In subsequent installations and videos he has continued to delve into the conformity and humiliation of the "successful wage earner". *Inside Track* (2004) is a robotic installation where three top executives, one American (*Mark*), another North European (*Günter*) and the third Asian (*Lee*) crawl through the corridors of an office in a mad rush to be the first to reach the success. In *Horizons* (2004) they are one hundred miniature businessmen crawling like soldiers in combat on an abstract world map: a large area of artificial turf that includes mountains, seas, demarcations, cities, oil fields and other points of interest. Miniature entrepreneurs cross oceans and national borders in their ongoing battle for success, but wrecking the world in the process. The fear of a possible slavery of the human race, associated with dystopian literature where machines replace individuals, suffers a twist: human beings are already on their knees and are robotic servants of a global economic system.

The non-existent 'radical' separation between artistic work and manual development in traditional Japanese culture has allowed important industrial designers such as Shunji Yamanaka or Takeshi Ishiguro to develop pieces that can be viewed either as art or as design objects. Shunji Yamanaka has created an impressive robot: *Cyclops* (2001) (<http://www.lleedd.com/cyclops>) that updates the image of the mythical *Cyclops*. The work consists of a mechanical flexible spinal column (3.60 m high) from which one eye protrudes and two arms hang, slightly reminiscent of the figure of a human being. The spine has a flexibility similar to the spine of a human being and is made up of fifteen ball joints controlled by fifty artificial mechanical muscles that are moved with compressed air devices. The central computer controls the flexible and sinuous movements of the entire structure to direct and follow "with the eye" what it is contemplating. Its only "eye", a CCD camera connected to the computer, has optimized programming to analyze the environment and differentiate between moving human-sized objects. Eye contact in our society

corresponds to the first level of communication and intuitive understanding of the feelings of our fellow men. The visual contact established between the visitor and the Cyclops humanizes its construction and establishes affective bonds.

The artist considers that the psychological effect produced by the movement of the eye-cyclops can serve as a reference in the development and design of future intelligent organisms and creatures. The aim of the project is to confront the audience with a creature whose behavior resembles a living being, even when its spatial displacement is limited. The Cyclops cannot follow rapid movements made by a person, but it has a sufficient level of artificial intelligence to produce a reflection on the meaning of "similar to an intelligent organism". The spatial technological limitations are not detrimental to the project, moreover, the work does not seek an anthropomorphic physical reproduction, but a visual and intimate contact between systems from the premise of a human-machine interaction.

In this same philosophical line of entities that represent and update the presence of forms similar to those found in Nature, Yamanaka made Ephyra (2007) for the exhibition *Senseware - Tokyo Fiber'07*. The "organism" covered by a flexible and extensive skin, has twelve arms sensitive to contact that move with hydraulic mechanisms, imitating tentacles in continuous movement. At the end of each limb there is a very delicate sensor. When visitors try to touch the creature, it retracts its tentacles and "hides". The robot is programmed to recreate a continuous life process, when nobody touches it, its tentacles expand and contract like an animated being. For Yamanaka, the complexity of robotics must go beyond mere anthropological copy. Each "creature" will assume its own appearance depending on the functions and objectives for which it is intended.

"Robots will develop their own rational forms to suit their technological functions and specific applications. We believe that this project has helped to show that human metaphors don't help us to understand emerging robot technologies. Cyclops is a proposition that we should start a fresh journey in search of an original aesthetic. There is now a unique new class of product - robots - and we are only starting to develop new forms to realise this." [14]

In an interview conducted in 2010 by the director of the Tokyo Gallery, Yukihiro Tabata, with the technological designer Takeshi Ishiguro (<https://takeshiishiguro.blog>) he once again emphasized the non-differentiation between the two areas. He considers art as the first step in conceptualization, experimentation and research that can lead to possible new developments, without denying an exit towards the world of design, with its more commercial aspects. With a classical training as a designer at the Royal College of Art in London, his work leans more towards the artistic sphere, reaching the conclusion that design can be treated as art and art must have a good design. His final degree project *Rice Salt & Pepper Shaker*, a salt and pepper shaker made with artisan techniques, was included in the

permanent collection of the New York Museum of Modern Art.

The interest in working with different materials and technological applications has represented a new challenge in each project, a challenge to find the union between poetry and the delicacy of Asian culture and high tech production. *Balloon* (2007), presented in the *Sonarmatica - International Festival of Advanced Music and Multimedia Art - Sónar* of the same year, is a set of spheres made with reflective material and filled with helium that float in the air. We could not properly define them as robots, but with a very simple programming, a mini fan and a series of sensors a complicated behavior is generated. The flying objects manage to move without ever touching the ground and, at the same time, avoid different obstacles that visitors may find themselves among. The original idea was born from a dream of Ishiguro where he played with an object suspended in space that moved freely and for an unlimited time.

In recent years, parallel to the development of Japanese industrial robotics, there has been an effervescence of artistic production in Asia, especially in South Korea or Taiwan, some close to evolutionary aspects of amorphous and inflatable forms aesthetically similar to recent works. by artist MacMurtrie, as *EX-DD-06* by Shih Chieh Huang; others reproducing conceptual schemes on forms of "slave" work in machines and assembly lines, such as *The self-portrait machine* by Jen hui Liao or, finally, closer to the conception of the body of the living being as a "raw material" capable of being modified and hybridized *Organ-machine Hybrids* by Doo Sung Yoo.

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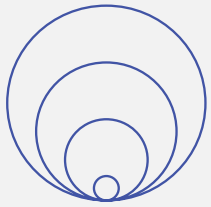
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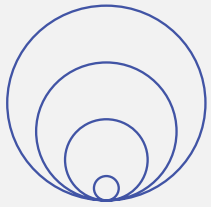
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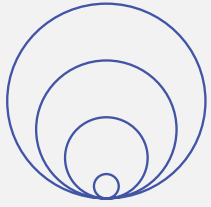
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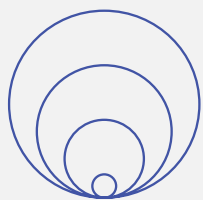
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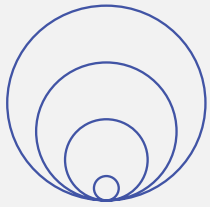
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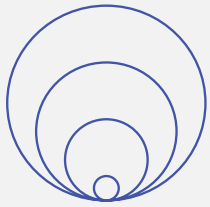
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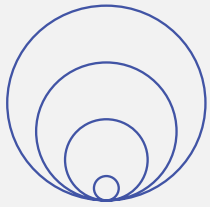
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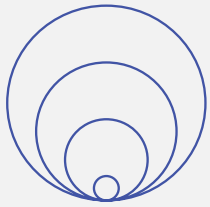
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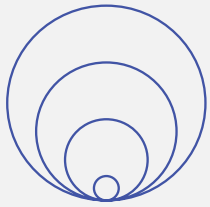
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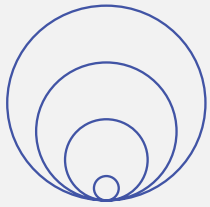
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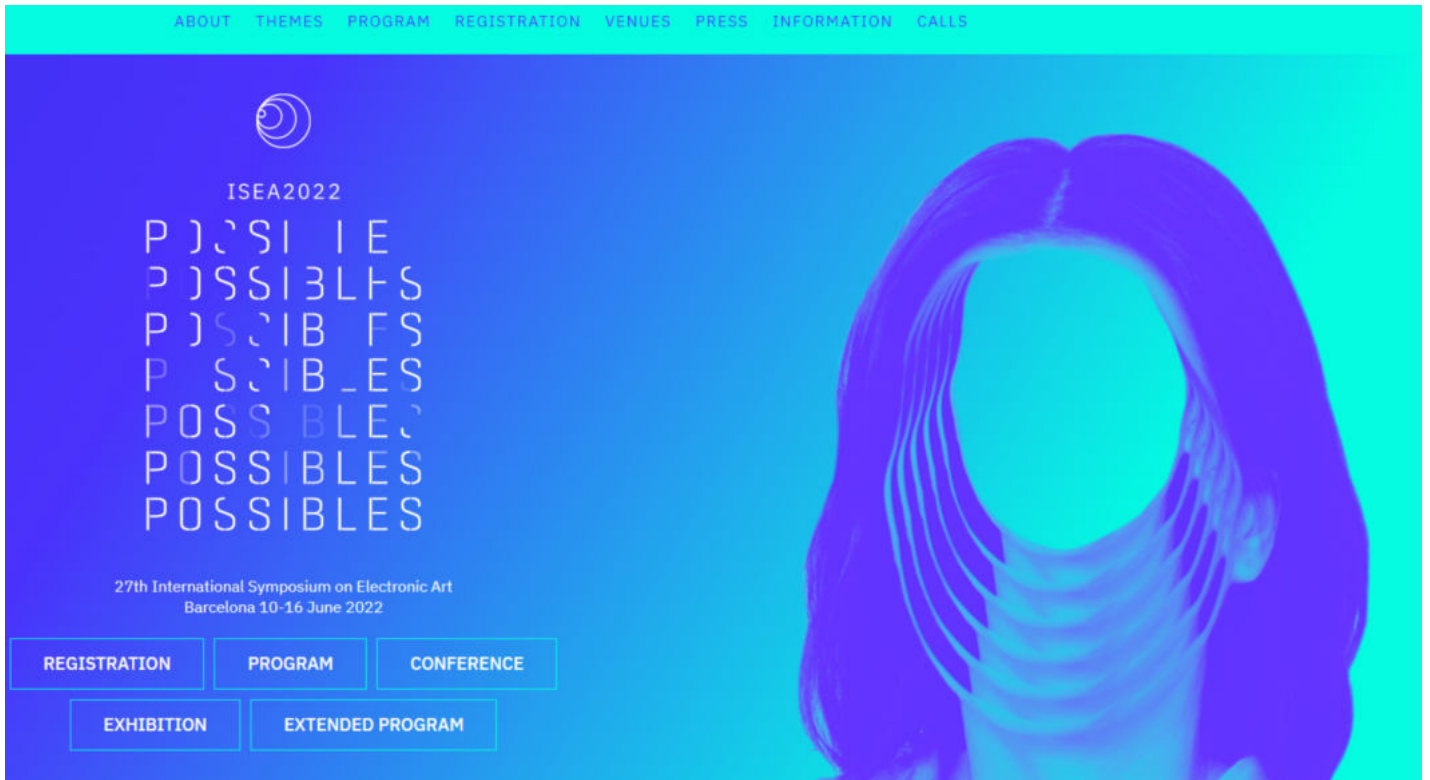
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Second Press Release – May 25

First Press Release – April 7

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Artnodes

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