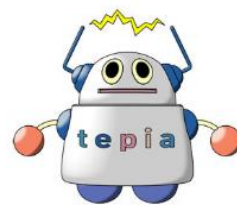


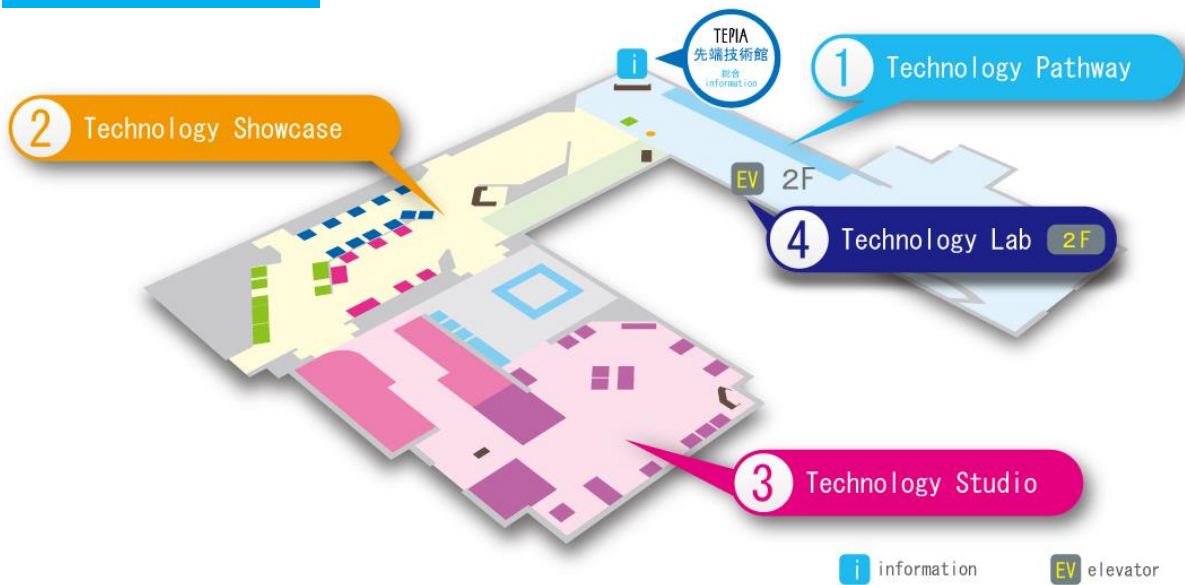
TEPIA Advanced Technology Gallery

**EXPERIENCE
THE ADVANCED TECHNOLOGY
OF THE FUTURE**



[♪ 000] = sound guide is available

GUIDE MAP



① Technology Pathway

~Living beings x ideas=new technology !! ~

Many new technologies are developed recently by learning from nature and aiming at living together with nature. Here, we will introduce technology of biomimetics that imitates excellent functions and structure of living beings.

② Technology Showcase

~“Overcome various constraints”~

We, human beings, are living with some constraints all the time. By making efforts to overcome those constraints, many scientific technologies were created. Here we will introduce technologies that go beyond the walls that we thought impossible to go over, by classifying the technologies into 3 categories; “Overcome the constraints of time and space”, “Overcome the constraints of body” and “Overcome the constraints of nature”.

Overcome the constraints of time and space

If there are technologies which have capability to think, process at high speed and make motion instead of us, it will be possible to create time for us. If logistics progresses by utilizing space currently unused such as outer space, it will conveniently shorten the amount of time. If high level communication technology is available, people can feel close when they are far apart.

Overcome the constraints of nature

Human beings, in the same manner as other living beings, cannot live without receiving blessings of nature on the earth. However, nature exercises overwhelming influence sometimes and we are exposed to the threat. If we can live without going against nature, receive sunlight to make energy like plants do, and rapidly capture the signs of natural disasters to protect ourselves, it will be possible for us to live in harmony with nature. Here, we introduce advanced technologies to realize sustainable living by utilizing natural power and living together with nature.

Overcome the constraints of body

We human beings made tools and acquired techniques to use them. By doing so, human beings have achieved outstanding developments compared to other living beings. By utilizing the intelligence, human beings have overcome the constraints of physical capabilities. If we are able to analyse and make use of our physical mechanisms, our physical capabilities will be expanded further. We will introduce here advanced technologies, not only to extend our physical capabilities, but also to overcome physical constraints by developing materials and technologies to make up for damaged functions.

③ Technology Studio

This is a corner you can experience how the current advanced technologies appear in our future “life” and “society” as products and services. We will also introduce Japan’s unique technologies that lead world manufacturing.

④ Technology Lab

There are experiential exhibits for understanding robot technology and a video library corner that offers high-tech images.

Entrance

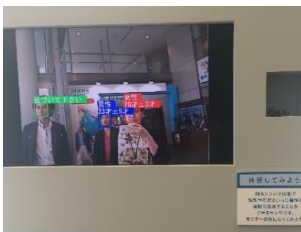
At the entrance, we have arranged the technologies that visitors to TEPIA would enjoy, such as large screen 4K TV with technology that presumes ages and genders, and unprecedented liquid crystal display with specially processed glass.

TOSHIBA CORPORATION
REGZA



This TV copes with two elements; larger display and clear detail images, and it reproduces various screen images, including terrestrial digital broadcasting, even more beautifully than before.

OMRON Corporation
Facial Feature Extraction technology



It analyzes image of the face captured by camera and presumes gender and age of that person. Analysis is made mainly on the shape of the face, distances between eyebrows, eyes, nose and mouth corners, and from these characteristics it derives general estimates of gender and age. It takes approximately 0.04 seconds to complete estimation of one person and it can work on plural number of people captured by camera at the same time. It may be used for making analysis of visitor groups at shopping center and event venues. It can be used for marketing data.

Zikoo LLC
INTELUX



This is a digital signage system that cultivates new dimension for space effecting and image expression by merging mirrors, TV and touch sensor. It is possible to do touch operations through existing glasses.

Sohgo Security Services Co., Ltd.
Reborg—X

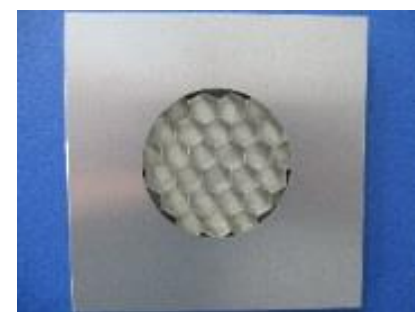


This is an autonomous travel robot with strengthened communication functions with the theme of "Fusion of people and robot." It can be customized according to application purposes and facility environment.

Technology Pathway [🎵 001]

~Living Beings X Idea = New Technology!! ~

Here, we take you through various examples of “biomimetics”, a technique to combine superb function living beings naturally have with new ideas to form new technology. Insects, birds, animals and plants – all are equipped with unique features to accommodate to different conditions on earth and survive. Such wonders of the nature contribute to the development of science and technology a great deal.



Technology Showcase

Overcome the constraints of time and space

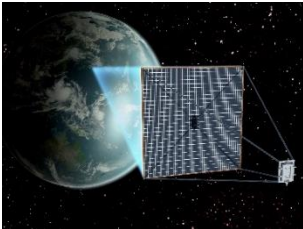
Japan UAS Industrial Development Association
Drone [♪ 002]



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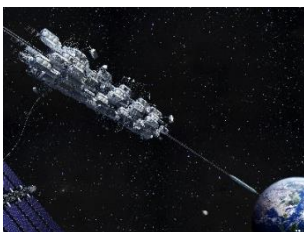
“Drones” - they are often mentioned in recent news. They are unmanned aircrafts flown by remote piloting or auto-pilot programs, and come in different sizes and purposes. In addition to hobby use, they are used in wide range of fields, including aerial photo/movie shooting, surveying, inspection, observation, surveillance, precision agriculture, and logistics. It is considered as the “aerial industrial revolution”. Many efforts are made for the use of drones all over the world. In Japan, the legal environment surrounding drones was improved with the amendment of the aviation law last year, ahead of the rest of the world, and the rapid popularization is expected.

Japan Aerospace Exploration Agency
Space Solar Power Systems [♪ 003]



Space-based solar power system generates electricity by the solar power facilities and transmission equipment and is the “power plant in the outer space”. The solar panels can catch the sun light regardless of the weather and the time, thus it is regarded as a promising, stable provider of energy. The plan involves the conversion of the generated power into microwaves and laser and the wireless transmission to the receiving site on earth, which requires the technology to precisely control the direction and guarantee the safety. Other challenges such as mass transportation technique to the outer space, the construction technology to build a large space structure and operation/maintenance (repair) technique within the outer space environment are being addressed, and the project is making steady progress toward the actualization.

OBUYASHI CORPORATION
Space Elevator [♪ 004]



The space elevator – it is researched as the means to transport mankind and supplies to the outer space much more economically and in larger quantity than “rockets”. The idea is to place a space station on the geostationary orbit, about 36,000km altitude where the gravity and the centrifugal force are equal, and to extend the cable of 100,000 km in total extension above and below the station to maintain the balance. The carriage attached to the cable is used as an elevator. The light-weight and strong carbon nano-tube with 20 times larger tensile strength than steel is considered for the cable. When completed, the transportation to/from the outer space will be easy and the research in the outer space, mining of resources in the solar system, and the space journey are no longer mere dream. There still are many issues to be overcome, but once those issues are solved, the implementation in 2050 is a realistic goal.

The National Institute of Advanced Industrial Science and Technology
SCCToolKit (Small Computings for Clinicals ToolKit) [♪ 005]



SCCToolKit assists the development of the image processing application for medical use. The task used to require a computer dedicated for high-speed computing and the special software. But with SCCToolKit, high-speed applications to process images from endoscopes can be easily developed with a small and affordable PC. It also has the benefit to enable medical staff to try out the application with ease, contributing more active development of medical applications. Combined with smartphones, it can be extended to the IoT system of medical purpose which is expected to popularize medical applications and various services including home medical care.

Ory Laboratory
OriHime [♪ 006]



“OriHime” is the robot that can be operated like your another self from a remote place. Built-in web camera, microphone and speaker enable you to speak to people face to face over a great distance. It can take action such as tilting its head and raising one arm to greet by the remote control. While “OriHime” does not have a facial expression, it can express many feelings by its voice and movements. The objective of “OriHime” is to enable people to easily communicate with their loved ones while they are away due to medical reasons or relocation for business.

National Institute of Information and Communications Technology
Standard Time of Japan [♪ 011]



Our lives are based on time. The standard time in Japan is Japan Standard Time (JST), determined at National Institute of Information and Communications Technology (NICT) in Koganei, Tokyo. The definition of a second is crucial in determining JST. The definition of how long one second is used to come from the astronomy based on the rotation and revolution of the earth, but was revised to that from the quantum mechanics based on the wavelength of atomic radiation in 1967. It states as “the duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the cesium 133 atom”. In other words, the property of the cesium 133 atom is extracted as microwave. Based on this definition, NICT determines JST by the time 18 cesium atomic clocks generate. It is very accurate with the margin of error of one second in 100,000 years. The information of accurate time generated this way is transmitted to nationwide via standard waves and internet.

Seiko Solutions Inc.
Time Server Pro. [♪ 012]



In the modern society we live, many devices are connected to internet and various information are exchanged. In order to accurately send/receive huge amount of information, the electrical devices that handle such information have to have the perfectly aligned clock. It is called “time synchronization”.

Rendezvous of people only requires synchronization of their watches in minutes. But electrical devices need the synchronization at the accuracy of “one millionth of a second”. This product has been developed in response to such needs for “time synchronization” coming in the near future.

Japan Automobile Manufacturers Association
Automated Driving [♪ 007]



Automated cruise is an essential technology to actualize the highly mobile society that is the safest and the most efficient in the world as well as “zero accident”, “zero traffic congestion”, “free mobility” and “highly efficient logistics”. We are committed to utilize the technology for everyone in the traffic including motorcyclists, bikers and pedestrians. We are now working on spreading preventive safety and drive assistance technologies which are already used, to bring the technology in practical use. Simultaneously, we are developing the technologies with incrementally advanced/intellectualized versions in an effort to make cars safer and more comfortable. For the development/popularization of automated cruise technology, proper legal environment, infrastructure, transport setting are needed on top of the technological development of cars. Social acceptance is also important. These call for the cooperation with all parties involved, not only automobile industry. We consider up to 2020 as the practical realization/introductory period, up to 2030 as the further popularization/ expansion period, and up to 2050 as the social establishment/maturity period, and aggressively promote the introduction and popularization while forming social consensus.

Rappa, Inc./UBIC, Inc./Vstone Co., Ltd.
AI-based robot 「Kibiro」 [♪ 008]



Kibiro is a robot with the artificial intelligence “KIBIT”, our unique program to understand the subtlety (delicate changes) of human mind. Tell him in your daily life about your favorite books and your opinion on the restaurant you visit on that day, and he will use the information to learn your preferences at high accuracy. And it will find the shops and products to match your preference from a flood of information on web in a flash. You have to choose and judge many things in you daily life, but it is impossible to refer to all the information out there. Kibiro is a great partner for a human being to support you with finding the right information for you and making your life fuller.

RIKEN CEMS
Superconductive Quantum Computers [♪ 009]



The quantum computer is a theoretical computing system that uses the “superpositioning and entangling” nature of “quantum” for high-speed computing. In theory, it can finish the calculation the fastest super computer of today cannot handle in several thousand years in a very short period of time like some tens of seconds. “Qubits” which can take two conditions (“0” and “1”) simultaneously is the base unit for the information processing. In order to actualize this, “Josephson device” using superconductor is utilized, and now the research has come to the stage where basic circuit of the quantum computer is feasible.

RIKEN CEMS
Skyrmion Memory [♪ 010]



Skyrmion (named after the original describer) is a very tiny whirl of magnetic moment (the smallest magnet) in $10 \times 10^{-9}\text{m}$ in size. This whirl can be created and killed by electric current. Once generated, this whirl can stay in a stable condition. We can use the existence of this whirl as “1” and non existence as “0” to apply for the information memory. When the research on this is advanced, we will be able to handle huge volume of data at high-speed, possibly resulting in playing games with realistic and clear 3D movies and traveling all over the virtual space. Also, it should enable us to share large amount of information with people over the world in a flash.

Overcome the constraints of nature

a.a.c., Inc.
Aquaponics [♪ 020]



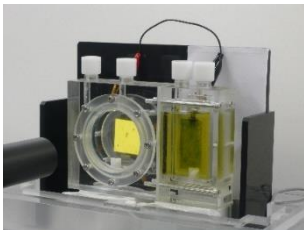
Aquaponics is an agricultural method to perform fish breeding (aquaculture) and tank farming (hydroponics). Excretions of fishes are dissolved by microbes to become fertilizer required for plants and fishes grow vividly in a water cleaned by absorption and purification by the plant. Originated more than 1,000 years ago, it has drawn attention again as an eco-friendly environmental system. This product has made it possible to perform aquaponics indoor. While such plant factory has drawn attention now that grows plants indoor like a factory, manufacturing facilities like an aquarium may appear in the future to make you feel ease of nature provided by fish and plant in cooperation.

euglena Co., Ltd.
Euglena [♪ 021]



Euglena is one of algae with 0.05 mm in body length. With properties of both plant and animal, it contains 59 kinds of nutrients including amino acid, vitamin and minerals. Now that its mass cultivation has become available, euglena has been distributed to be used for nutrient-rich functional foods. In addition, euglena is expected to be used in broad fields including fat extracted from it to be used as bio fuel and the residual arising from the extraction process to be used as feeding stuff for foods production as well. Furthermore, the process of mass cultivation of euglena has drawn attention to be useful for improvement of carbon dioxide immobilization and water purification.

Panasonic
Artificial photosynthesis [♪ 022]



With the sun exposure, plants create nutrients (energy) required for growth from carbon dioxide and water such as glucose. "Artificial photosynthesis" has been developed by focusing on this mechanism. It is possible to create methane and ethanol for fuel use by making carbon dioxide and water cause a reaction with the sunlight. This device, in particular, realizes a conversion efficiency similar to plants by using gallium nitride, which is also used for LED lights, for the electrode. It's a new technology to stay one step ahead in that carbon dioxide to cause global warming is converted into energy.

Shimizu Corporation
The Environmental Island GREEN FLOAT [♪ 023]



Green Float is a future city project integrating "Green to mean vegetabilized city" and "Float to mean marine city". Based on a floating island constructed at equatorial sea with abundant sunshine and less impact of typhoon, we aim to realize a life fused with nature. Magnesium alloy to be obtained from sea water is used for the structural material. Building a tower with a height of 1,000 m at the center of the island, people reside at upper floors while generating energy by electric generation utilizing natural energy fully and recycling of garbage and achieving self-sufficiency by plant factories disposed at the lower floors.

Japan Oil, Gas and Metals National Corporation (JOGMEC)
Geothermal power generation [♪ 024]



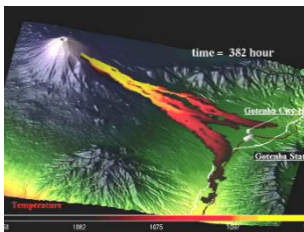
With high-temperature magma chambers under volcanoes, water penetrated near there is heated by the magma to become high-temperature water and vapor and they are collected in a space under a bedrock which is hard to permeate water to generate a geothermal reservoir. Digging a well from the surface of the ground to there, geothermal power generation creates electricity by exploiting vapors which were collected there. Since it generates electricity by naturally created vapor, geothermal generation is believed to be eco-friendly with almost no carbon dioxide to be discharged compared with thermal power generation which burns oil and coal. Even though energy resources are heavily dependent on import in Japan due to its poor domestic supply, geothermal resource is rich enough without any concern of depletion because it is a volcano giant nation. Geothermal generation is expected as a renewable energy with a capability of stable electricity generation regardless of weather.

National Institute of Information and Communications Technology (NICT)
Phased array weather radar [♪ 025]



Phased-array Weather Radar has been developed aiming at swiftly detecting symptoms of torrential rain and tornado. This weather radar has adopted a system to change the direction of vertical transmit-recvie beam electronically and immediately. In addition, observation data of orientation direction is obtained by rotating the antenna itself. Therefore, it has become possible to swiftly detect torrential rain and the like just by 30 seconds with its capability of 3D observation of rain within a radius of 60 km. It is expected to be useful for disaster prevention by distributing detected information of rain via SNS and applications of smart phone.

NIED (National Research Institute for Earth Science and Disaster Prevention)
Supercomputer simulation of a volcanic eruption [♪ 026]

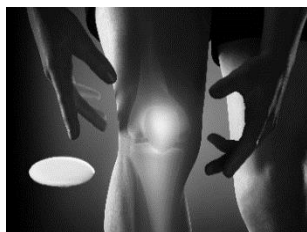


Even though it is possible to observe fairly accurately warning signs such as volcanic earthquake, crustal movement, and volcanic gas prior to volcanic blast, the mechanism has been unknown to determine whether or not the abnormal phenomenon actually results in blast and, if blasted, how the scale of blasting is. Therefore, we have been trying to develop a modeling and numerical simulation technology regarding various volcanic phenomena from ascent and vesiculation of magma accumulated beneath a volcano to efflux to the ground as well as to make it useful for disaster prevention.

Overcome the constraints of the body

Japan Tissue Engineering Co., Ltd.

J-TEC Autologous Cultured Cartilage 'JACC' [♪ 013]



Even though cartilage is responsible for lubrication of joints, once it was damaged it does not cure naturally because cells and supply of nutrients are poor at cartilage due to lack of blood vessels. However, it is possible to grow extracted cartilage cell by feeding nutrients under improved environment. Cultured cartilage is created just in such a way. By transplanting “self-cultured cartilage” created from a cartilage of the patient him- or herself to a part lack of cartilage, symptoms including pain is relieved with the damage repaired. This therapy has been already available being covered by insurance in university hospitals.

NEXT 21 K. K.

Direct Fabricate Custom Bone Implant 'CT-Bone™' [♪ 014]



In case of “bone transplant” using the patient’s and other’s bone or artificial bone, burden to patients tended to be great as a result of long surgery time because it was needed to process it to match the lost part of the bone during surgery. For that reason, a custom-made artificial bone “CT-Bone™” has been developed. Since it is formed by a 3D printer based on X-ray CT image of the patient, it is possible to form a shape to fit perfectly to the part of the bone to be filled up. As it is possible to freely design well into inside the bone including passage of blood vessels, it is expected to be able to create internal structure which may replace the bone of the patient soon after transplant.

The University of Electro-Communications / Meltin MMI Co., Ltd.

Myoelectric-Controlled Prosthetic hand [♪ 015]



When a human tries to move fingers, an order from the brain is transmitted to the muscles as a weak electric signal. “Myoelectric hand” operates by detecting “myopotential” which is sent from muscles in such a case. Even though conventional ones were only able to perform such simple movements as to grasp and open the hand due to incorrect detection caused by individual difference in myopotential and sweating, it has become possible to realize movement of the wrist and independent move of fingers by the function to learn movement pattern of fingers. Further, it is possible to provide custom-made myoelectric hand which is light and fitting to the fingers by using 3D printer for formation. We aim to realize that myoelectric hand is available for more people by affordable price zone.

NEC Corporation

ARmKeypad [♪ 016]



ARmKeypad is an user interface developed by NEC using augmented reality (AR). Based on a recognition technology in cooperation with spectacle (supported by: EPSON MOVERIO BT-200) and wristwatch type wearable devices, a virtual keyboard and enter button are displayed on the forearm over the glasses. If you touch on the forearm by the finger, it works to reflect contents of the operation by an acceleration sensor of the wristwatch type device to detect timing of the touch as well as the spectacle type device’s camera to map the position of the finger. It contributes to promotion of efficiency in such business types and operations as required for hands-free operations such as security, distribution and medical care in addition to equipment test and maintenance service for which physical keyboards are difficult to be used.

Logbar Inc.
RingZERO [017]



Operation of a smart phone and home appliances is possible from a place up to 15m away by a motion to “depict a triangle in the air by a finger” in a state with this ring type device attached to the index finger. Types of settable finger motion are infinite and more than 20 types of actions are available as of now. LED, vibration, touch sensor, and six-axis sensor are installed in a minimal space with a thickness of a few mm and weight of approx. 5g. It is expected to be used for daily affairs such as self-taking by a smart phone and operation of music applications as well as for business scenes such as achievement of smart home by operation of home appliances and presentation as well.

INNOPHYS Co., Ltd.
Muscle Suit [018]



It is a wearable auxiliary device capable of assisting up to 30kg of load on the back when lifting something heavy just by shouldering like a rucksack. With a built-in “artificial muscle” made of rubber tube covered by a nylon mesh and firmly fixed at the both ends, it is characterized by the use of force of air. When the rubber tube expands by infused air, it works in such a way that the nylon mesh shrinks in the longitudinal direction just like a human’s muscle and the load is converted into a tensile force. It is expected to be used at job sites which require hard work such as logistics, agriculture and nursing care.

Hiroshima University / Daiya Industry Co., Ltd.
Unplugged Powered Suit [019]



It’s a new system of walking support type powered suit which does not require neither battery nor motor. It supports a motion of a leg to take a step by contraction of an artificial muscle pressured by supplied air from a pump disposed on the sole of the foot while walking. A significantly flexible tube built in the artificial muscle has achieved low-pressure driving making it possible to support according to movement of the human. In addition, it is also possible to apply for improvement of walking and pitch speed such as enhancement of runners’ force to kick out by disposing artificial muscle along the soleus muscle and reinforcement of pitcher’s arm swing by disposing along the pectoral major muscle.

Technology Studio

~Experience the world of the future~

This is a corner where you can experience our state-of-the-art technologies being applied 10 years later from now in our “lives” and “society” as actual products and services.

SECOM

Flying surveillance robot [♪ 027]



“Secom Drone” is a surveillance service utilizing an autonomous drone which is a world’s first in terms of private security. When a laser sensor attached to an outer wall of a building detects a suspicious person or car a drone equipped with an LED light and a surveillance camera will quickly fly to the location based on its positional information. Utilizing its original sensing technology and space information processing technology automatic tracking by finding the optimal route is possible even if the subject is moving. Even at night it will take color photographs helpful in identifying the subject such as license number, model of car, its body color, person’s face and clothing and it will send real time images to the control center.

Flower Robotics, Inc.

Patin [♪ 028]



Patin consists of a body, a service unit on the upper part of the body and a Pit and Cloud for charging and communicating. With sensors such as a 3D camera attached to the body it recognizes space and movement of people and with its 360° rotational wheel it moves swiftly to the location of the target person avoiding any obstacles. In addition, by learning about human movement patterns connecting to Cloud Patin grows so that it can move to match the movement of that person. Depending on the service unit equipped with, it can carry out various functions and in the future development of service units with functions helpful in the nursing environment or the lives of elderly living alone such as a monitoring function and a communication function is anticipated.

PIONEER CORPORATION/Shiseido Co., LTD

Organic EL lighting for makeup [♪ 029]



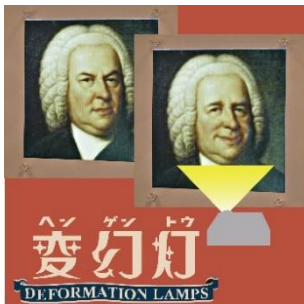
OLED lighting which emits light by passing electrical current through an organic material emits light in a plane and not in a point therefore reflection is little and light gentle on the eyes can be created. Furthermore, Pioneer OLED lighting with its original RGB stripe construction can recreate not only white color light but various color lights and scenes by adjusting the degree of each RGB light emission individually. In addition, compared to existing lighting equipment it is more energy efficient and not only does it reduce CO2 emission but it does not contain toxic substances such as mercury and amount of heat generated is minimal therefore from the point of view of environmental friendliness it is anticipated as the next generation lighting.



This is a technology of automatically measuring the pulse rate from the image of your face taken with a smartphone or a tablet with a built-in camera or your computer Web cam. Hemoglobin contained in your blood stream has a property of absorbing green light. Blood stream which changes with the pulse rate changes the brightness of the green color of your face ever so slightly. It detects this slight change in the brightness of your facial surface which a human eye can not detect and tracks the pulse. In doing so it measures the pulse unconsciously, for example when using your computer and it makes it possible to naturally maintain your health without having to make the effort.



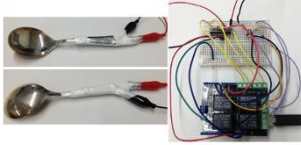
Earthquake counter-measure technologies for buildings consist of such things as earthquake resistance, vibration control and seismic isolation. Of these, seismic isolation which controls shaking most effectively is a method whereby a device is inserted under the building to isolate it from the ground so that the tremors will not be transmitted directly to the building. THK seismic isolation device supports the building and minimizes the transmission of the earthquake tremor by combining "LM Guide" which fends off the shaking and dampers which minimizes the shaking according to the speed of the earthquake.



As opposed to the existing projection mapping being a technology of projecting a movie on a still object surface, deformation lamp is a technology whereby a moving pattern is projected in monochrome to a still object to make it look as if the still object itself is moving. Human brain analyzes separately the color, shape and movement of a subject and afterwards merges them to perceive the movement of an object. The only information projected by the deformation lamp is the movement therefore the color and shape of the still image will not move but even if there are inconsistencies with the information the brain has a corrective function. Using this phenomenon it can give an illusion of the object actually moving to a human's eye.



This large screen TV is called "REGZA65Z8X", a Toshiba lifestyle product capable of 3D stereoscopic display and no modification is done to it whatsoever. Since this product is a 3D stereoscopic TV a highly detailed circular polarizing filter is affixed and instead of images of the left and right eye needed when viewing stereoscopically two images, one seen by the naked eye and the other only seen when wearing a polarizing glass, are displayed. If two images are displayed normally the image seen with the naked eye will be double but using the ExPixel FPGA technology the image seen with the naked eye will be only displayed by fusing the two images. There will come a day when this technology will be operational with a touch of a TV remote button. Not only in the living room but it can also be used for games and multi lingual display. Currently a tool for game developers and software to convert PowerPoint presentation by Fujitsu Social Science Laboratory are being developed.



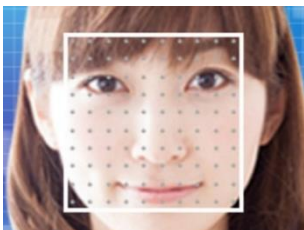
Taste produced by electrical stimulation of the tongue is called “Electrical Taste” and depending on the strength of the electrical current you can experience flavors such as metallic, saltiness, sourness and bitterness. The tip and the handle of the spoon are the electrode and a circuit is formed via food and drinks on the spoon and taste is magnified using anode and cathode. Material made of silver is used for the spoon so that it would not harm the human body even when electrical current is passing. Use as a pseudo “Seasoning” or sharing the same taste by sending electrical stimulation data as a recipe to a remote person may become a possibility.

Panasonic Corporation
Cloud based Home Vegetable Factory [♪ 035]



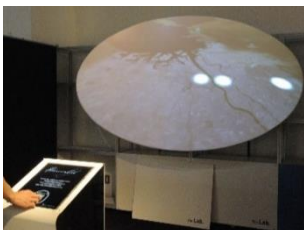
Household plant factory is designed to blend in with your room and furniture with the purpose of being used in the home. The greatest feature is that by networking it is a high value-added plant factory. Inside is a camera and you can ask a specialist cultivation requirements such as lighting, temperature, nutrients and CO2 via a website. You are able to confirm cultivation conditions remotely therefore depending on cultivation conditions you are able to take appropriate action. In addition, its effect in revitalizing the regional community is verified by exchange of harvested vegetables and sharing recipes through the website.

Glory LTD.
Face authentication system [♪ 036]



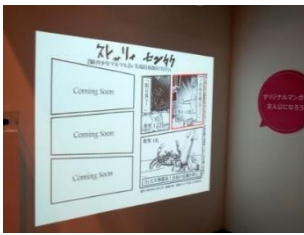
Face recognition system automatically identifies a person from the surveillance camera digital image and takes what is seen to be the face portion from the live image and compares it with the face image in the database. It can control entering/exiting of people by automatically detecting and matching the face taken by a camera for example at the entrance of an apartment and automatically opening the door. It can also find a specific person by automatically detecting faces of people at large-scale retail facilities and train stations where many people come and go. In addition, since it can estimate the sex and age from the digital image, by collecting and analyzing customer information such as age/sex specific product preference, services such as providing automatically recommended product information to suit the age and sex can be offered.

Hirose-Tanikawa Lab., The University of Tokyo
Sharalog3D [♪ 037]



Sharelog 3D was developed as a public art (Art work put in public spaces and not in limited spaces such as museums) which can be enjoyed using data from a transportation IC card. On a transportation IC card there are maximum of 20 travel information records. It records from which station to which station the cardholder has travelled in the past. When you read the data using an exclusive card reader it matches that with a database of latitude and longitude of the station used and a history of the person's movement is mapped on to a 3D map synthesized with an urban model as a trace of light and projected in front of you as an image art. This is a participation type public art work where the viewer can experience a bird's eye view of their movement.

Shirai Lab., Kanagawa Institute of Technology
Manga Generator [♪ 038]



“Manga Generator Shunkan Boy Marumaru” uses motion capture technology which reads the movement of people by a camera linkage and you are able to create your own story by going inside the Manga. It is a system whereby you adjust the position of speech balloons and sound effects according to the position of the person thereby putting yourself easily in to a frame. It reads your feeling from the positional relationship of both knees, both armpits and the back and displays the background to match and evaluates the finished Manga hence understands the “fun side” using a computer.

Challenergy Inc.
Typhoon power generation [♪ 039]



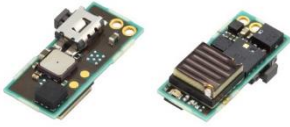
“Vertical axis type Magnus wind power generator” is different to conventional wind power generators in that instead of a propeller it has a cylinder and it generates electricity using “Magnus power” which occurs when rotating the cylinder in the wind. Magnus power can be controlled by the rotation of the cylinder, therefore even in a strong wind it is operational without being uncontrollable. In addition, being a vertical axis type, the wind direction will not affect the machine. Therefore electricity is constantly generated even in a typhoon situation with strong winds and wind direction changing frequently. Furthermore, it has the advantage of being more quiet and bird strikes will be less likely to occur compared to conventional power generators. An energy of one typhoon is said to be the equivalent of 50 times the electric energy used in Japan in one year※. This technology which changes typhoon from disaster to an energy source is expected a lot from many Asian nations with high occurrence of typhoons. ※Ministry of Land, Infrastructure, Transport and Tourism Chubu Regional Development Bureau “Natural Disaster Energy(provisional calculation)”.

HopeField,Inc.
E-cat Kit [♪ 040]



What is attractive about E-cat Kit is its simplicity. You only attach a system unit with built-in battery and control system and wheels with built-in motor and brakes to an existing wheelbarrow. You operate the accelerator lever with your right hand and brake lever with your left hand. You can attach a seat for the operator to sit on as an option. The tires of the wheelbarrow are standardized so it can be attached to most wheelbarrows. In addition, the body of E-cat Kit weighs approximately 7 kg therefore attached to a wheelbarrow the total weight will be approximately 17 kg and hence it is one-third of the weight of a ready-made electric product. It has a short turning radius and can go up slopes easily.

Alps Electric Co., Ltd. Multi Sensor Network Module



The technology called IoT (Internet of Things) is now drawing attention, which enables things to exchange information each other via the Internet. With their sensor, things will notice various information including light, heat and vibration, and the data collected will be transferred through networks without any human intervention. IoT utilizes this process to support machines to work more intelligently, and generate a brand new information service by using the collected data. And this technology inevitably requires "Multi-sensor network module" which incorporates various sensors and also provides communication function. Since it is a small device, one can put on the device by mounting it on a watch or glasses, etc.

MIZUHO Corporation Sugita clip



Clipping surgery for brain aneurysm is performed to treat cerebral vascular diseases with high mortality, i.e. "subarachnoid hemorrhage and brain aneurysm (which is the cause of subarachnoid hemorrhage)." Once a brain aneurysm ruptures, it causes subarachnoid hemorrhage. If subarachnoid hemorrhage occurs or if a critical brain aneurysm is found, surgery must be performed to shut the root of the brain aneurysm after opening the skull, so that no blood will flow into the brain aneurysm. Sugita Clip is specially designed for closing such root of the brain aneurysm. It was originally invented in 1976 by Dr. Keiichiro Sugita, neurosurgery physician, and currently 134 types of such clips have been developed. The latest product, "Sugita Titanium Clip II" provides broad opening width and facilitates flexible operation during surgery, and furthermore, it firmly holds even minute blood vessels with its constant closure function. Besides, the clip uses titanium alloy as its material, which offers excellent biocompatibility and durability. Unlike iron, titanium will not receive any influence of a magnetic field, and so it will not cause any effect on Magnetic Resonance Imaging (MRI) scan.

ENGINEER INC. Neji-Saurus (Screw Removal Pliers)



Neji-Saurus is a special pair of pliers; even when a screw is worn at its head and cannot be turned with any driver, or a screw gets rusted and cannot be removed, Neji-Saurus can remove them easily with small strength. Normal pliers only have horizontal serrations at their top's inside; on the other hand, as Neji-Saurus also employs vertical serrations, it can hold firmly and turn any screw.

The slits on the vertical serrations is designed with so-called Comaneci-Angle (which provides excellent friction against the screw being held), so even any truss head screw with low height head can be hold without any slippage. The international patent is granted for this technology to the inventor, Engineer Inc.

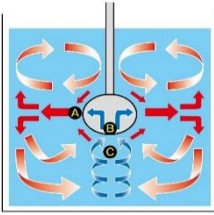
Towa Denki Seisakusho CO., LTD. Fully Automatic Squid Fishing Machine



In the midst of recent fisher successor shortage problem getting escalated, "Full-Automatic Squid-Fishing Machine" with computer controlling feature successfully automated the whole process of squid fishing.

It offers excellent efficiency that allows one man to control the squid fishing machine (which can be installed up to 64 units per one fishing vessel) from the bridge (vessel control room), and furthermore, it successfully digitized the skillful technique called "Shakuri" (jiggling the bait) and made it computer-controlled. In addition, the squid fishing machine can capture ship's rocking caused by changing weather or tide with its sensor and automatically control its own movement, which enables minimizing any trouble on the ocean.

EDDY PLUS CO.,LTD
C-Mix



In order to stir any liquid substance, an propeller-shaped stirrer is used in general. "C-Mix" provides highly efficient stirring with completely new shape. The half-ball shaped spinner (central part) has an L-shaped flowing way, and liquid can flow in and out through it. When the spinner rotates in liquid, centrifugal force works on its discharging ports, and liquid in the flowing way is discharged. Upon discharging of liquid in the flowing way, liquid is sucked from the sucking ports below the flowing way, and at the same time, tornado-like whirl occurs. In this mechanism, when discharging force is transformed into tornado-like sucking flow, "Push to Pull" flow occurs and liquid is stirred efficiently .

Stirring by "C-Mix" works effectively even towards corners or hidden parts of any container. Conventional stirrer with rotating blades may damage the container and cause wasteful particles, but such concern is not relevant for C-Mix.

NIPPURA CO., LTD.
Large Acrylic Panels for Aquariums



In order to create an aquarium where one can enjoy seeing 10m-long whale sharks swimming and eating as they wish, a massive tank measuring tens of meters may be needed. This would be impossible with the glass tanks conventionally used in aquariums, but with these large acrylic panels, the demonstration to show "how one feels in the water" can be provided. With unique lamination technology and joining technology, no loss of strength or transparency occurs even when many layers are overlaid; 8.5m tall, 3.5m wide, and 3-4cm thick acrylic panels are overlaid to provide appropriate thickness, and join them side by side in order to create a massive panel. The panel's thickness is calculated with elements including the required size and shape of the tank, the water depth, and the calculation is done based on a deflection rate that realizes the fish swimming inside to be seen vividly without any bias. Presently, these panels are installed in the Churaumi Aquarium in Okinawa, and in the "Zhuhai Chimelong Ocean Kingdom" in China, which is recognized as the largest in the world by the Guinness Book of Records.

KOKEN LTD.
Clean room



In clean rooms, since minute particles are originated (dust generation) by various sources including people working inside, dust generation during work cannot be zero. Also, there has been challenging issue that once any dust is generated, it takes time to gain original cleanliness, and cleanliness gets lower during actual work.

By generating coherent airflows that collide between the two push hoods, KOACH can maintain cleanliness without making an area closed, by avoiding air inflow from outside. Furthermore, even if dust is generated during work, such dust is removed quickly and original cleanliness is retained. This process allows cleanliness during work to be kept at high level.

Also, as clean room level environment is created with installing equipments and no additional building is needed, this can be utilized at various work spaces including table top and whole room, etc. Such clean room level environment has required a lot of effort, time and cost, but now it can be easily realized at any place.

The environment with higher level of cleanliness which manufacturing in the future requires can be maintained with KOACH.

ROHM Co.,Ltd.
The Industry's Smallest Class Chip Resistors



This small electronic parts are used with various items around us such as smart phones or digital cameras, and smaller parts provide many favorable features. For example, smart phones get smaller and lighter when parts inside get smaller. Available space can be used for mounting bigger battery, which provides longer battery life. Moreover, tiny products which is small enough to be wearable can be created.

FANUC CORPORATION
CNC(Computerized Numerical Control)



A machine tool moves its processing tool toward a processed goods, and in order to get the intended shape, it applies cutting and grinding on the subject. In order to process and realize the intended shape, distance and point to move a tool is digitized, a motor is controlled by a computer, and a machine works accordingly. Overall, such system is called CNC equipment .

CNC equipment can also control the speed to move a tool.

by DENSO WAVE Co.,Ltd.
VS-060



VS-060 is a 6-axis vertical multi-articulated industrial robot that achieves the class top level high-speed performance with a 4kg capacity.

From a standard assembly and transport to a surface inspection of the product of complexed shape (curved, etc.), or to works such as polishing and screws tightening, all of these can be done with its advanced technology that is comparable to the work of skilled workers.

Hardlock Industry Co., Ltd.
Hardlock Nuts



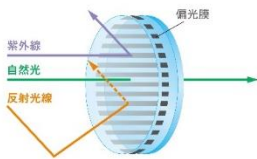
"Accidents by loosened screws" occur over 20 thousand times domestically, and one of their main reasons is that, when bolt and nut are tightened and load is added repeatedly to tightening part of bolt and nut, then very fine tolerance of screw between bolt and nut causes initial tightening force (bolt axial force) to decline and fatigue breakdown of bolt. Such tolerance between bolt and nut has been successfully removed completely by combining two nuts (to which special concavo-convex process is applied). By tightening a nut with round shaped projection (which is made eccentric from central axis) with a nut with round shaped dent (which is not made eccentric), force towards vertical direction of bolt axis is applied to the bolt, and massive lock effect is generated (such effect is similar to something like knocking a wedge). In Japan, this technology is utilized at many places such as bullet train bodies and joint between rails, among others, and also used internationally in many industries including railway operators.

Hamamatsu Photonics K.K. Photomultiplier Tube



Photomultiplier tube is a highly sensitive light sensor which senses invisible light by amplification from 1 to 10 million times. Smaller version's size is just several centimeter, and it is mainly used in medical equipments and analytical equipments. Besides, at the research facility "Super Kamiokande," 11,129 units of photomultiplier tube with the largest diameter in the world (50cm, or 20 inch) are installed: The facility provided support for the observation of neutrino by Mr. Takaaki Kajita, the winner of 2015 Nobel Prize in Physics. When neutrino flies from the space collides electron etc. inside a huge tank (diameter and height: 40m each), slight light is generated only in the blink of an eye, and the photomultiplier tube installed inside the huge tank amplifies the slight light and senses as electrical signal.

HOPNIC LABORATORY Polarized Lens



Polarized lenses use a film interspersed between lenses to suppress diffuse reflections of light, and realize reduction of glare. To produce a lens that could be gentle to eyes and cause less fatigue, the Hopnic Laboratory needed to find ways of controlling light entering into the eyes. The laboratory started from hand-crafting the machinery required for producing polarized film, and created the technology to turn this film into a lens. After that, the laboratory successfully developed a thin, light lens using their own original technology. This technology is composed of inserting process in which polarized film with a thickness of 40microns uniformly inserted into plastic resin with a high refractive index (high capability to refract light), and forming process in which the lens is formed without creating any air bubbles. The Laboratory enjoys the world's highest share (i.e. 90%) of high refractive polarized lenses for correcting vision, and in addition, their products are used by leading lens manufacturers in Japan and abroad.

Amaike Textile Industry Co., Ltd. Amaike Super Organza



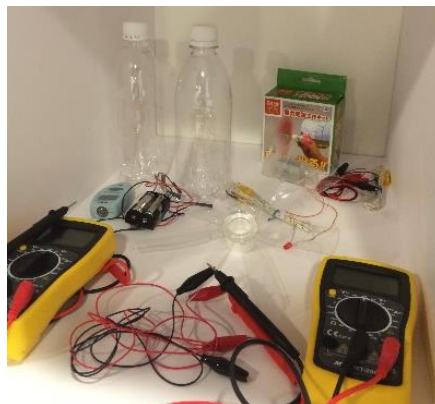
The lightest "Tennyō-no-Hagoromo" weighs only 5g/m², and is a thin fabric for high-class fashion that can be worn with feeling as if wearing air. Its lightness and thinness have been provided by using very fine polyester and nylon yarn of 7 denier and 5 denier. In addition, when it is woven with silk (14 medium), it creates a soft and moistish texture. And when it is combined with ultra-fine stainless steel (24microns), a unique metallic luster and creased feeling is attained. Likewise, there are many possible combinations of fabrics which provide new expressions. With its lots of possible textures and design ideas using dyes, etc., "Tennyō-no-Hagoromo," receives high reputation among the fashion world, and furthermore, it is used by famous European brands as well as the Milan and Paris collections.

Workshop Space

This space allows visitors to perform experiments, observations and modeling in order to understand principles of state-of-art technology.

Various workshops are prepared in this space.

Also, workshops regarding our exhibits and scientific course units is to be provided.



Technology Lab 2F [♪ 042,043,044,045]

The basic functions of robots, and their controlling technology and principle can be experienced easily here.

Also, various video movies regarding high technology and our exhibits are provided free of charge at the Video Library.

