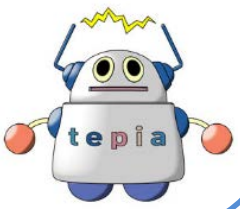
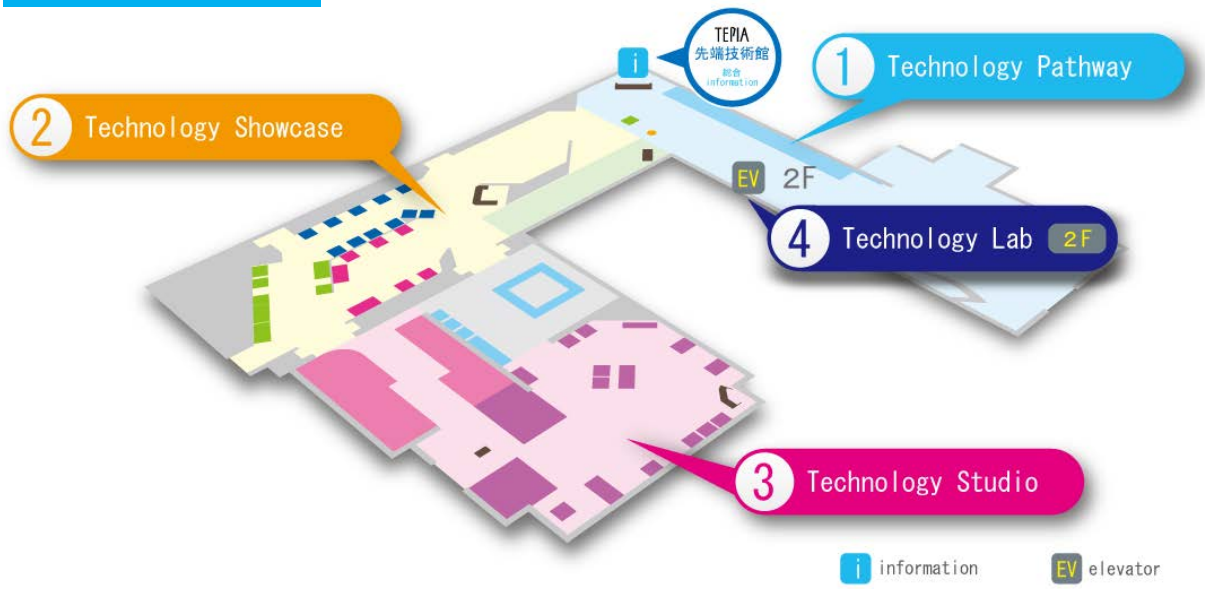
TEPIA Advanced Technology Gallery

EXPERIENCE
THE ADVANCED TECHNOLOGY
OF THE FUTURE



[♫000]＝sound guide is available

GUIDE MAP



①Technology Pathway

～ The Future “AI” and “IoT” Will Provide ～
“AI” and “IoT” are helpful in solving various societal issues, from the declining population to the increase in regional inequalities. This is an introduction to the changes to our lifestyles and to our societies that will be brought about by the use of “AI” and “IoT”

②Technology 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.

③Technology 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.

④Technology Lab

Includes interactive exhibitions that allow visitors to understand robotics technology, exhibitions on technology related to 3D printers that have revolutionized the world of manufacturing, and a video library corner focused on high-tech video.

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 [♫ 001,002,003]

~ The Future “AI” and “IoT” Will Bring！~

Currently our society is beset by numerous problems, with particularly major issues including the aging of the population, population decline, and the increasing number of regional inequalities. Expectations are riding high for “AI” and “IoT” to solve these social issues.
This is an introduction to how “AI” and “IoT” will be used to reduce the labor shortage, invigorate society, and create a more comfortable, convenient, secure, and safe living environment.

What is “AI”
AI attempts to let machines do that things that humans do using their intellects. For example, as AI is able to learn from and analyze large volumes of data to automatically find characteristics not noticed by people, it is expected that AI will be able to check against image data to anticipate failure or malfunction in machinery, and perform automated driving of vehicles.

What is “IoT”
The IoT (Internet of Things) is a system that connects a all sorts of objects through two-way communication technologies to realize advanced services. As an example, it is expected that equipping home appliances and other nearby devices, factory production lines, and so on with sensors and communication equipment, and letting these connect to the Internet and exchange information, will enable data collection, remote operation, and automated control.

Technology Showcase

Overcome the constraints of time and space

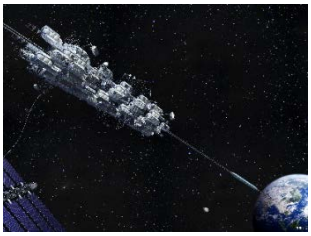
SECOM CO., LTD.
Flying surveillance robot [♫ 004]

“Secom Drone” is a monitoring service that uses an autonomous drone to provide the world's first private crime prevention tool. Laser sensors installed in a building search for an intrusion by suspicious people or cars and then quickly send to the scene a drone equipped with an LED light and a surveillance camera. Its proprietary sensing technology and its geoprocessing technology are utilized to determine the optimum route for automatic tracking of a moving target. Color video capture, available even at night, is useful for identifying targets. Those color images are sent to the control center in real time, making a whole new level of security and safety a reality.

Axelspace Corporation
AxelGlobe [♫ 005]

" AxelGlobe " is an integrated service that captures images of the Earth using ultra-small observation satellites and uses that image data for analysis. These satellites are less than 100 kilograms in mass and less than 1-meter-long, yet they come equipped with 2.5-meter resolution sensors that are able to detect a car on the ground. By launching 50 of these satellites, detailed image data can be captured daily across nearly all the land of the planet Earth. This vast amount of Earth observation data is expected, in the case of agriculture, to be used for estimations of yield, fertilizer usage, and optimum harvest time. . The details of whole earth Image data will be available every day.

OBAYASHI CORPORATION
Space Elevator [♫ 006]



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.

Carea Corporation
Non-contact vital sensor [♫ 007]

The non-contact vital signs sensor is a small device that can measure heartbeat, breathing, and body movements without contact. The device operates on the principle of the Doppler effect by sending out weak radio waves and analyzing the differences seen when these radio waves are reflected by moving objects. Because the device does not need to be worn on one's body, it will not get in the way of everyday life. By installing this censor in nursing care facilities and hospitals, physical abnormalities of the elderly or other patents can be quickly detected and arrangements can be made for staff or an ambulance to intervene.
The ultimate goal is to advance the work of the life-sciences in ways such as estimating movement trends, improving sleep quality, reducing stress, improving concentration, and preventing dementia. It is recommended that this technology be introduced in household electronics such as in lighting fixtures or in air conditioners.

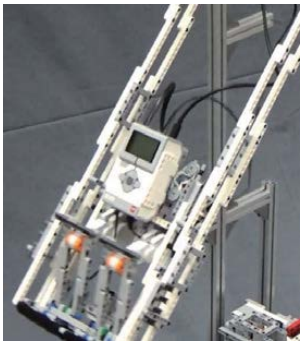
Ory Laboratory
OriHime [♫ 008]

"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.

Seiko Solutions Inc.
Time Server Pro.　[♫009]

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 .

Hitachi, Ltd.
Hitachi AI Technology/H　[♫010]



AI is essential in making the most of the IoT (Internet of Things) in our lives. It is used to develop dedicated AI around the world, which can specialize in various goals. However, AI development requires a large investment in time and money.
This is the reason that Hitachi AI Technology/H (AT/H) was developed. This is a general-purpose AI that can serve multi-faceted needs rather than be exclusive to a singular goal. It can be added to existing systems, and when a person expresses a goal, AT/H uses information from big data as a hint for self-growth as it produces results. It can become able to efficiently solve a large number of problems.

Waseda University
Automatic Colorization of Black and White Images with Artificial Intelligence (AI)　[♫011]

By using the deep network, one aspect of AI technology, characteristics of images can be extracted for clues to how they should be colored, allowing black and white photos to be colorized naturally. Up until recently, colorizing black and white photos was a time-consuming task performed by people, but now black and white photos can be automatically colorized by AI using vast image data to study coloration.
There may be new discoveries to find by adding color to historically important black and white photos.

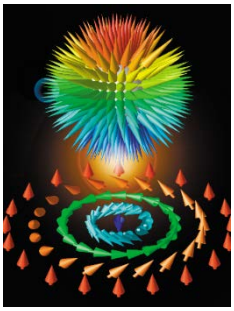
FRONTEO　Communications, Inc.／FRONTEO, Inc.／Vstone Co., Ltd.
AI-based robot「Kibiro」　[♫012]

Kibiro has the proprietary AI [KIBIT] installed to understand human nuance (subtle changes in the mind). It is a learning, answering mini-robot.
By communicating with it daily throughout your everyday life and telling it information about your preferences, it can use that information to study what kind of sensibilities you have with a high degree of accuracy. From that vast amount of information, it can swiftly find the information that fits you.
There are numerous opportunities for choices and decisions in daily life, and it is impossible to check all the information. Kibiro acts as a valuable partner to humans to help you find the information you like and aid in making your life richer.

RIKEN CEMS
Superconductive Quantum Computers [♫ 013]

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 [♫ 014]



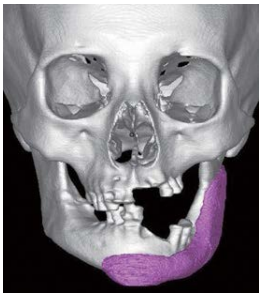
Skyrmion (named after the original describer) is a very tiny whirl of magnetic moment (the smallest magnet) in 10×10^{-9}m in size. This whirl can be created and killed by electric current. Once generated, this whirl can stay in a stable condition. We can use the existence of this whirl as "1" and non 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 the body

Japan Tissue Engineering Co., Ltd.
J-TEC Autologous Cultured Cartilage 'JACC [♫ 015]

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™' [♫ 016]

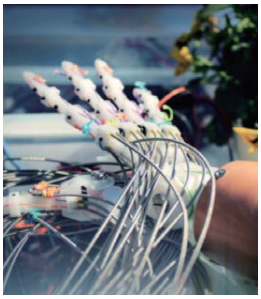


In case of "bone transplant" using the patient's and other's bone or artificial bone, burden to patients tended to be great as a result of long surgery time because it was needed to process it to match the lost part of the bone during surgery. For that reason, a custom-made artificial bone "CT-Bone™" 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.

Nikon Corporation
Cell culture observation system“ BioStation CT” and Quantitative image analysis software“ CL-Quant”
’ [♫017]

Induced pluripotent stem cells (iPS cells) are believed to be the key to regenerative medicine through their infinite proliferation ability as well as their ability to transform into various other cells, thereby creating human tissue or organs. However, one difficulty associated with these cells is that because iPS cells are very delicate, in the past humans would need to grow the cells while viewing them to determine their quality, with the additional problem of inconsistent results, as well as a burden of both time and money. BioStation CT and CL-Quant automatically and objectively determine the quality of living cells using high-quality images, providing stable and low-cost mass production of iPS cells.

The University of Electro-Communications / Meltin MMI Co., Ltd.
Myoelectric-Controlled Prosthetic hand [♫018]

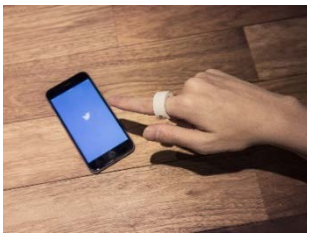


When a human tries to move fingers, an order from the brain is transmitted to the muscles as a weak electric signal. “Myoelectric hand” operates by detecting “myopotential” which is sent from muscles in such a case. Even though conventional ones were only able to perform such simple movements as to grasp 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.

INNOPHYS Co., Ltd.
Muscle Suit [♫019]

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.

Logbar Inc.
RingZERO [♫020]



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.

Oticon K.K.
Oticon Opn [♫ 021]

The incredibly swift processing speeds of the technology included in the Oticon Opn provide a more accurate soundscape of the surrounding listening environment. As in conventional hearing aids focus on the sound from the front and the conversation with only one person, Instead, the Oticon Opn takes in the entire surrounding soundscape and chooses the sound the wearer wants to focus on, and allows for free selection of the sounds the wearer wants to listen to even in noisy environments with many people. By providing sound information processed swiftly and accurately it reduces the cognitive load on the brain.
In addition, the Oticon Opn is the world's first hearing aid with internet connectivity. It is possible for your hearing aid to alert you when you receive an email, and for your hearing aid to inform your iPhone when batteries need to be replaced.

Keio University Graduate School of Media Design
TECHTILE toolkit / Karada tap [♫ 022]

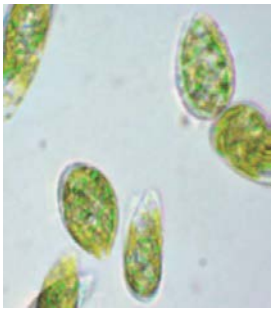
As the internet becomes an everyday part of life and the boundary between the "net" and the "real world" becomes blurred, the sense of touch is being recognized as an important way to perceive yourself and the outside world. If tactile information can be conveyed along with video and audio, it can provide information that "feels real" in a manner superior to any previous form of media.

Overcome the constraints of nature

a.a.c., Inc.
Aquaponics [♫ 023]

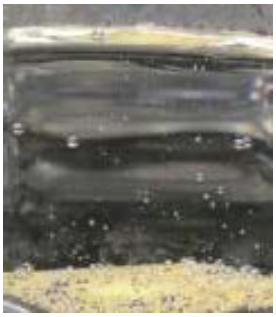
Aquaponics is an agricultural method to perform fish breeding (aquaculture) and tank farming (hydroponics). Excretions of fishes are dissolved by microbes to become fertilizer required for plants and fishes grow vividly in a water cleaned by absorption and purification by the plant. Originated more than 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 an 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 [♫ 024]



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.

New Energy and Industrial Technology Development Organization (NEDO) /
Japan Technological Research Association of Artificial Photosynthetic Chemical Process (ARPChem)
Artificial Photosynthesis [♫ 025]

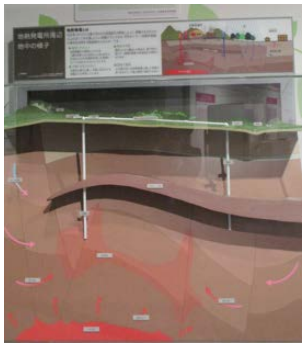


The NEDO (Artificial Photosynthesis Project *Development of Process Technologies for Production of Basic Chemicals Using Carbon Dioxide) develops technology similar to the photosynthesis process used by plants, but which uses light to make hydrogen (H2) and oxygen (O2) out of water (H2O) and use the hydrogen obtained to combine with carbon dioxide (CO2) to synthesize raw materials such as plastics. The carbon dioxide for this process is planned to come from emissions from factories or similar facilities producing carbon dioxide, a cause of global warming.
The photocatalyst sheet developed by this project comes in two types, a photocatalyst that converts water into hydrogen and a photocatalyst that changes water into oxygen, which are both coated in an optimum ratio. By simply placing it in water and allowing sunlight to shine it will divide the water into hydrogen and oxygen.

LAPIS Semiconductor Co., Ltd.
Soil environment sensor [♫ 026]

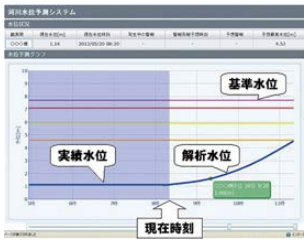
“Soil environmental sensor” embedded in soil is the advanced equipment for measuring the acidity (pH value), the soil environment such as moisture content and temperature. Measurement of acidity is not done with the typical glass electrode method, but instead utilizes ion-sensitive field-effect transistor technology on the same semiconductor chip as the water content and temperature sensors for the sake of miniaturization. In addition, the surface of the sensor uses hydrophilic film that makes it easier to contact water in the soil, increasing the reliability of the measurements.
By combining this with the wireless communications module, it is possible to monitor the soil conditions in real-time without being present at the location, and it is expected to be useful for agriculture as well as for disaster prevention.

Japan Oil, Gas and Metals National Corporation (JOGMEC)
Geothermal power generation [♫ 027]



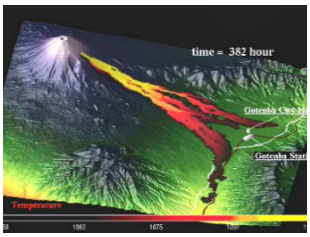
With high-temperature magma chambers under volcanoes, water penetrated near there is heated by the magma to become high-temperature water and vapor and they are collected in a space under a bedrock which is hard to permeate water to generate a geothermal reservoir. Digging a well from the surface of 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.

JFE ENGINEERING Corporation.
Real-time River level Forecasting System“ WinmuSe® Caesar”　[♫ 028]



Artificial intelligence that has studied data showing the past relationship between rainfall amount and river level can use the real-time rainfall, river level, and rainfall forecasts to automatically predict future river levels. Not only is it no longer necessary to conduct detailed local surveys or gather extensive data, the water level of rivers of various shapes and sizes can be accurately forecasted swiftly, and there can be a quick response to sudden flooding or for repair work. Evacuation notices can be given on short notice in the case of heavy rain, and it is useful for preparing disaster prevention systems that can quickly deal with the actual conditions on the ground.

NIED (National Research Institute for Earth Science and Disaster Prevention)
Supercomputer simulation of a volcanic eruption　[♫ 029]



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.

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.

MJI Inc.
Tapia [♫030]

Tapia's round body is equipped with a camera, speaker, microphone, and touch panel monitor. You can enjoy daily conversations thanks to the voice recognition, voice synthesis, and facial recognition features required for conversation, in addition to a cloud-based response system. Her system adjusts the expression of her eyes in response to conversation as well as her enjoyment in response to conversation, allowing her to learn, develop, and become closer to you the more she is used. She can help with phone calls, weather reports, schedule management, news reading, and even aid in video conversations with family in far-off places. She can even help you watch over the room while you are out and about.

Caiba Inc.
Telexistence robot“ caiba” [♫031]

The operator wears a head-mounted display and operates the robot from a cockpit. The robot and the cockpit are connected via the internet. The connection is P2P after passing through the authentication server. The robot follows the head and arm movements of the operator, providing easier operation than with a joystick. The built-in camera and microphone send video and audio from the location to the operator, allowing for the possibility of real-time communication using conversation as well as gestures.

PIONEER CORPORATION/Shiseido Co., LTD
Organic EL lighting for makeup [♫032]

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.

FUJITSU LABORATORIES LTD
Real-Time Pulse Monitor Using Facial Imaging [♫033]

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.

THK CO., LTD.
Seismic Isolation Systems [♫034]

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.

NIPPON TELEGRAPH AND TELEPHONE CORPORATION
Deformation Lamps (HenGenTou) [♫035]

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.

Kanagawa Institute of Technology Shirai Lab.
ExPixel [♫036]

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.

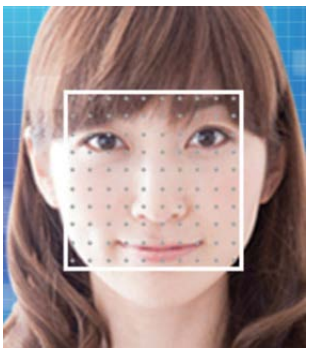
LIFULL CO.,Ltd.
GRID VRICK [♫ 037]

When you arrange the layout of a home with toy blocks and have an attached computer read that arrangement, a conceptual 3D image will be shown on the display. The blocks are divided by color into types, such as walls or doors, and a realistic 3D image of the home will be shown in accordance with the positioning and the size of the block. The arrangement can be changed easily by simply rearranging the blocks. In addition, by using a computer you can freely change the interior design, such as the wallpaper, and then save that data for later comparison. You can even experience a simulation of walking inside the home by wearing a head-mounted display.

Logbar Inc.
RingZERO [♫ 038]

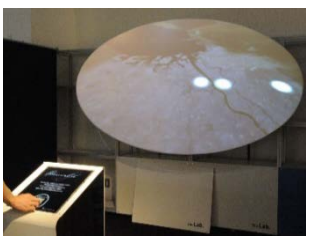
Household plant factory is designed to blend in with your room and furniture with the purpose of being used in the home. The greatest feature is that by networking it is a high value-added plant factory. Inside is a camera and you can ask a specialist cultivation requirements such as lighting, temperature, 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 [♫ 039]



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 [♫ 040]



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　Shirai　Lab./ProgMind　Inc.
Manga Generator　[♫041]

“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　[♫042]

“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. Magus 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)”.

RT.WORKS co., ltd.
Robot Assist Walker RT.2　[♫043]

This robot is equipped with a sensor that can detect if the user's hand is on the controls, as well as sensors that detect the slope and condition of the road, and sensors that detect the operating environment. Based on the information detected by these sensors, the movements of the motor can assist walking by automatically switching between offering assisted movement in the direction the user is moving and applying the brake. The robot adds forward propulsion with a power assist on upward slopes, while applying the brake on downward slopes to appropriately slow the speed. This in addition to automatically stopping when hands are off the device allows the robot to support walking by adjusting appropriately to the situation. It is also equipped with a speech function, allowing it to assist with phrases such as, "There is a steep slope here, please be careful." When finished using the device, it also helps you by announcing the distance walked and by offering congratulations of a job well done.

Japan Manufacturing

Spiber Inc.
QMONOS [♫044]

They say that spider silk is the strongest fiber in the world. If it is possible to make a spider silk thread 1cm thick, it will make a material so strong that it could stop a jet that is taking off. It was much hoped that the mass production of artificial spider silk could deliver a new dream material that does not use petroleum, and "QMONOS" has made the dream come true by succeeding in its mass production for the first time in the world. Spider silk is a "protein" that also makes up our bodies. The mass production of artificial spider silk is made possible by culturing microorganisms as hosts of genetic information of the protein, which enables the microorganisms to produce the protein efficiently. Produced protein materials can be used for making a wide range of materials in various forms, including fiber films, sponge, powder and nanofibers. They can also be dyed in different colors.

Towa Denki Seisakusho CO., LTD.
Fully Automatic Squid Fishing Machine [♫045]

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 [♫046]

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 [♫ 047]

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 [♫ 048]

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.

FANUC CORPORATION
CNC(Computerized Numerical Control) [♫ 049]

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 [♫ 050]

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 [♫ 051]

"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 [♫ 052]

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.

ROHM Co.,Ltd.
The Industry`s Smallest Class Chip Resistors [♫ 052]

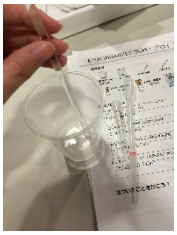
This small electronic parts are used with various items around us such as smart phones or digital cameras, and smaller parts provide many favorable features. For example, smart phones get smaller and lighter when parts inside get smaller. Available space can be used for mounting bigger battery, which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

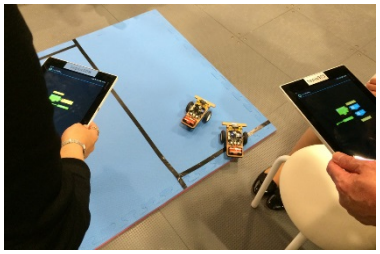
TBM Co., Ltd.
LIMEX PAPER [♫ 054

LIMEX PAPER is a material made by combining limestone and polyolefin (resin), and is used as a replacement for traditional paper. It uses almost none of the water or wood normally used in the production of paper. Because it uses limestone, a mineral abundant everywhere on Earth as the main ingredient, it reduces environmental problems such as water shortages or the destruction of forests. Just like regular paper it can be printed or written on, while its appearance, weight, and thickness is nearly the same as everyday paper. In addition, it is also very water resistant and durable. It can also be recycled semi-permanently. Not only useful for paper, this material can also be widely used as a replacement for plastic products.

Workshop Space

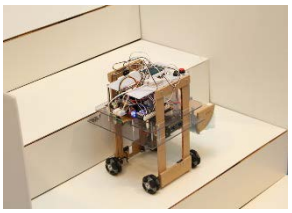
This space allows visitors to perform experiments, observations and modeling in order to understand principles of state-of-art technology.
Various workshops are prepared in this space.
Also, workshops regarding our exhibits and scientific course units is to be provided.





“The Challenge” Robot Development Exhibition

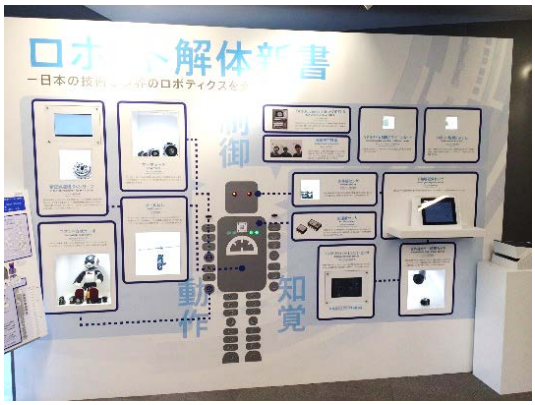
Selected entries from “The Tepia Challenge,” a project that supports original robot development among junior and senior high school students, are currently on display.



Teams that are selected to participate in “The Tepia Challenge” are provided with development funding, technical support, and an opportunity to present their achievements. The junior and senior high school students produce robots that solve a problem, which they set themselves, and then present their work at the Robot Grand Prix in fall.
www.tepia.jp/tcs

Technology Lab　2F　[♫055,056,057,058]

Includes interactive exhibitions that allow visitors to understand robotics technology, exhibitions on technology related to 3D printers that have revolutionized the world of manufacturing, and a video library corner focused on high-tech video.



ROBOT & 3 D Printing classes

Three new levels added to the robotics classroom based on difficulty level

【STEP 1】 Basic components of robots and programming basics
【STEP 2】 Programming using words
【STEP 3】 Complex robot control methods

※We also plan to offer correspondence courses.

We also have a 3D printer classroom.

Using 3D modeling software, learn about 3D modeling technology and the fundamentals of creating three-dimensional shapes.
Try your hand at creating your own original work.

Workshops and classrooms are conducted in Japanese.