TEPIA Advanced Technology Gallery

EXPERIENCE
THE ADVANCED TECHNOLOGY
OF THE FUTURE

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

Population Aging

At present, elderly people over the age of 65 make up approximately 27% of Japan's population. Japan's population will continue to age, and it is projected that in 20 years, one in three people will be elderly.

As the population ages, there is concern about the spike in demand for medical treatment and care, resulting in increased medical expenses, as well as shortages of caregiving facilities and caregivers, to give two examples. It is desirable for society to utilize AI and IoT, so as to increase the number of active elderly people.

In this corner, we will introduce cutting-edge technology that will utilize IoT, robots and more to overcome the declining vitality in society due to the aging population, but at the same time, be useful for creating a society where the elderly can live with peace of mind.

Population Decline

Due to the declining birthrate, Japanese society is undergoing a rapid population decline. Because of the increase in the percentage of elderly people, the working-age population is declining even further, and if the GDP per person decreases, it will become harder to make economic prosperity a reality. In addition, there is concern that "quality of life" factors will deteriorate, such as it becoming difficult to obtain essentials goods and services due to labor shortages. In these circumstances, it is desirable to utilize AI and IoT to improve productivity, and bring about an affluent society.

In this corner, we will introduce cutting-edge technology that is expected to reduce the labor shortages caused by the population decline via the use of robots and AI (artificial intelligence).

An Increase in Regional Disparity

Although the population is concentrating in major metropolitan areas, the population decline is not stopping, and it is said that the number of "cities at risk for disappearing," whose continued existence is doubtful, has risen to half of the municipalities in the entire country.

When key agricultural and fishing industries decline due to the lack of successors and other reasons, the dynamism of the entire local society is lost, which invites the decline of services for daily life, and magnifies the regional disparity between urban and rural areas more and more.

In these circumstances, it is desirable to utilize AI and IoT in order to implement "smart" farming, among others, and revitalize industries that support rural areas.

In this corner, we are exhibiting cutting-edge technology, such as IoT and robots, that will be useful for eliminating the regional disparity between urban and rural areas.

Future Living

We introduce a variety of technology that will be realized in the cities,houses,shops and offices in the near future.

③hands-on computer programming experience area

This is the area for experiencing hands-on computer programming in accordance with difficulty level.

④Technology　Lab

This floor contains an exhibit of original robots developed by junior and senior high school students through the TEPIA Challenge Support Program . Also has a theater where you can watch videos about Japan's advanced technology and a video library.

Exhibitors cooperation organization name list (Titles omitted)

a.a.c., Inc.
by DENSO WAVE Co.,Ltd.
Caiba Inc.
Carea Corporation
FRONTEO　Communications, Inc.
FRONTEO, Inc.
FUJITSU LABORATORIES LTD
HATAPRO,INC.
Hirose-Tanikawa Lab., The University of Tokyo
Keio University Graduate School of Media Design
Manga Generator Consortium
Mitsubishi Electric Corporation
MJI Inc.
National Institute of Advanced Industrial Science and Technology
NIPPON TELEGRAPH AND TELEPHONE CORPORATION
OMRON Corporation
Ory Laboratory
RT.WORKS co., ltd.
Seiko Solution s lnc.
Shimizu Corporation
Sohgo Security Services Co., Ltd.
TBM Co., Ltd.
TOSHIBA CORPORATION
Towa Denki Seisakusho CO., LTD.
ZMP Inc.

※Alphabetical order

Entrance

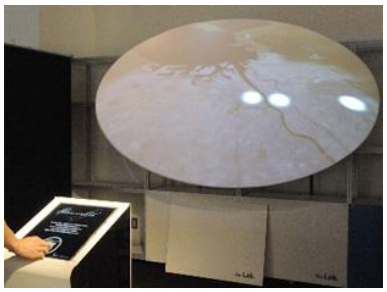
TOSHIBA CORPORATION
REGZA

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.

Hirose-Tanikawa Lab., The University of Tokyo
Sharalog3D



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.

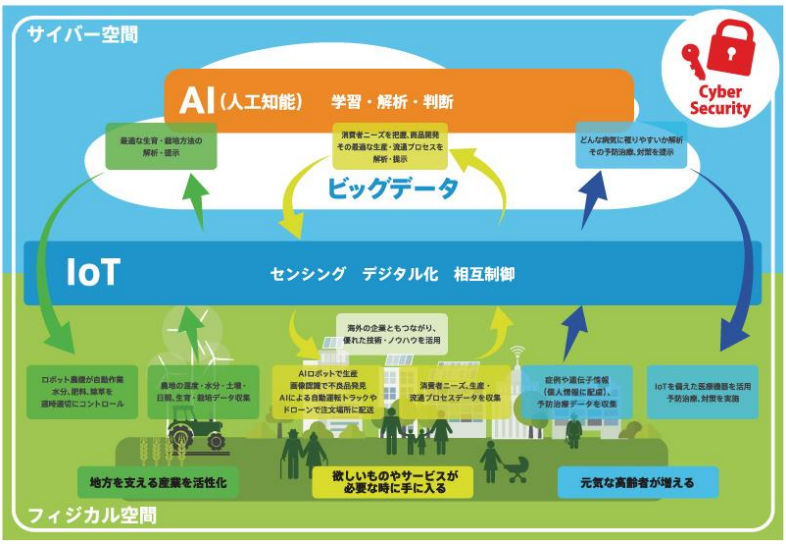
Sohgo Security Services Co., Ltd.
Reborg-X

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

~ 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.



②Technology Showcase

Population Aging

Carea Corporation
Non-contact vital sensor

At nursing care facilities, care workers usually make rounds every 20 minutes to check on patients. However, this poses a large burden on care workers. This sensor was developed with the objective of lightening the load by constantly monitoring the vital signs of elderly nursing-care residents. It places emphasis on respecting their lifestyles and privacy without compromising the quality of the services are provided. It helps ensure safety and peace of mind in the daily lives of the elderly. Another beneficial plus function that was added this year through the development of a new algorithm was the monitoring of the psychological aspects of a person's health.
Working style reform is a recent initiative being undertaken among Japanese companies. It promotes, among other things, creating a conducive working environment and supporting health management. The new sensors can detect employee stress and concentration levels as well as drowsiness. It can serve as a mental health care system that helps people become more conscious of their health.

FUJITSU LABORATORIES LTD
Real-Time Pulse Monitor Using Facial Imaging

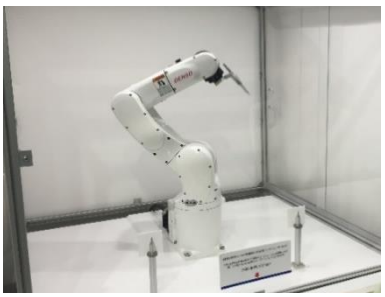
This is a technology of automatically measuring the pulse rate from the image of your face taken with a smartphone or a tablet with a built-in camera or your computer Web cam.
Hemoglobin contained in your blood stream has a property of absorbing green light. Blood stream which changes with the pulse 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.

RT.WORKS co., ltd.
Robot Assist Walker RT.2

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.

Population Decrease

by DENSO WAVE Co.,Ltd.
VS-060



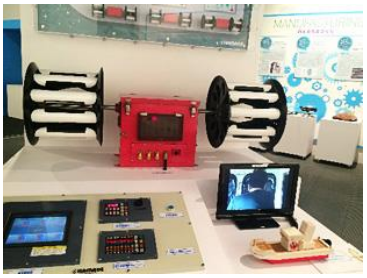
VS-060 is a 6-axis vertical multi-articulated industrial robot that achieves the class top level high-speed performance with a 4kg capacity.
From a standard assembly and transport to a surface inspection of the product of complexed shape (curved, etc.), or to works such as polishing and screws tightening, all of these can be done with its advanced technology that is comparable to the work of skilled workers.

ZMP Inc.
Logistics support robots「CarriRo」

The CarriRo logistics support robot was d enabling transport to be carried out enjoyably, even by women and the elderly.
Robotics has been applied to dollies used for transporting items to give them various functions. They are: an assist function for lightening a load, a "duckling" function in which unmanned dollies follow after a worker, and an autonomous mobility function where the dollies move automatically between specified areas. The robot dollies are capable of 8 hours of continuous operation and have a maximum speed of 6 kilometers per hour. With such high basic performance, they are assumed for use in a variety of settings.
These functions will not only lighten the load on workers but also help improve productivity by increasing the volumes transported and automating transport. They are designed to match cityscapes and propose new working styles. Use of the robot dollies to augment human labor will also contribute to alleviating labor shortages in logistics.

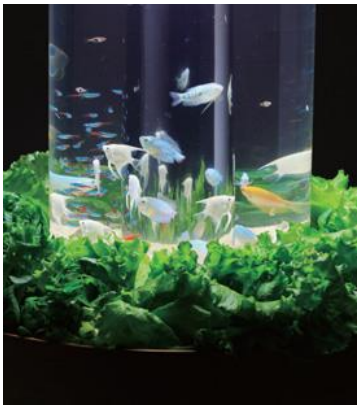
An Increase in Regional Disparity

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.

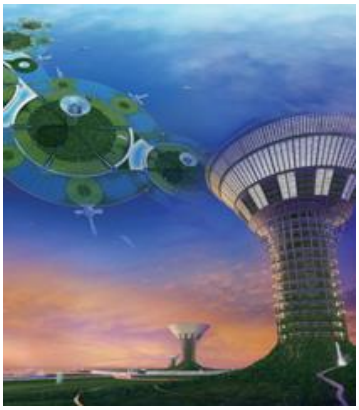
a.a.c., Inc.
Aquaponics



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.

Future Living

Shimizu Corporation
The Environmental Island GREEN FLOAT



Environmental Island Green Float is a future ecological city proposed by Shimizu Corporation using the company's comprehensive strengths. It is a plan to construct 3,000-meter-diameter and 1,000-meter-high artificial floating island cities on the equatorial Pacific.
The underlying concept is to create a botanical floating city that is sustainable and maintains a lush natural environment. The company is spreading this concept worldwide as an innovative idea for solving environmental issues.
If the island can be constructed in real life, it would achieve a recycling-based society of the future. There would be food self-sufficiency achieved in a comfortable environment that utilizes the natural offerings of the sea. Shimizu Corporation will continue to carry out technological verification toward realization of this concept.

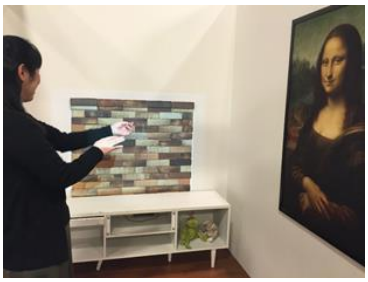
TBM Co., Ltd.
LIMEX Sheet

LIMEX Sheet 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.

Manga Generator Consortium
Manga Generator K.A.I

Have you ever dreamed of becoming a superhero and saving the world from a crisis? Of using superpowers, visiting an unknown city, or jumping straight into the world of your favorite manga? Manga Generator K.A.I. lets you do just that! It was developed for a contest by students of the Kanagawa Institute of Technology.
To enable you to jump into the two-dimensional world of manga, your image is taken by camera, and the shot is converted so that it can be incorporated in a manga. Your posture and poses and the emotion expressed by them are picked up through artificial intelligence-based machine learning technology. Suitable backgrounds and dialogue in speech balloons are generated to match the pose. Stories are also automatically selected depending on the testers height and comprehension.

NIPPON TELEGRAPH AND TELEPHONE CORPORATION
Hengento Projection



As opposed to the existing projection mapping being a technology of projecting a movie on a still object surface, Hengento Projection 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 Hengento Projection 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.

Keio University Graduate School of Media Design
TECHTILE toolkit / Karada tap

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.

Seiko Solutions Inc.
Time Server Pro.

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 .

Mitsubishi Electric Corporation
User Interface for Voice-activated Drawing

There are different ways to communicate with others when you are not familiar with their language, such as sign language or a foreign language. However, each method has its problems.
For example, you can converse with a person with a hearing disability by writing on paper. However, writing can be a bother and takes time.
There are translation apps for overcoming language barriers, but all it usually does it display the translation on a screen.
In most cases, you are limited to a text-based means of expression.
Because spoken word appears as text along the line traced by fingertip, the technology can be used easily by anyone.
By combining it with a multi-lingual translation function, a user can also communicate with people from other parts of the world.

MJI Inc.
Tapia

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.

HATAPRO,INC.
ZUKKU

ZUKKU is a palm-sized artificial intelligence robot. It is easy and inexpensive to adopt for use. The AI robot was developed with the aim of creating new value by developing hardware for the age of the Internet of Things, or IoT, and Big Data, and by providing analytical prediction through AI.
Retail shops can store obtained recognition data in a marketing information system to visualize information in order to carry out demand forecasting for a sales area or to formulate sales promotion measures. Automatic optimization of ad delivery can also be achieved using optional digital signage.
There is a wide variety of other possible uses, which include serving as a store tender at a shop, as a concierge when the desk has to be unmanned, or as an elderly monitor. There are hopes that it will provide added value through the utilization of artificial intelligence and robotics.

Ory Laboratory
OriHime

“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.

FRONTEO Communications, Inc.／FRONTEO, Inc.
Kibiro

Many of you may be leading a busy life away from family and wondering how they are doing. Kibiro is a robot with a monitoring function that helps bring together families who live apart. It promotes communication with loved ones and brings security and smiles to people's daily lives.
By using the monitoring function, Kibiro's internal camera and a smartphone app enables you to see elderly and other family members, who live on their own, as they interact with the robot. You can also use Kibiro to communicate with them through voice and text messages. It will help you feel like faraway family members are close by.

National Institute of Advanced Industrial Science and Technology
PARO

Paro is a seal-type therapeutic robot developed for use by people who cannot keep pets or at facilities where animal-assisted therapy cannot be readily adopted. Unlike real dogs, cats and other animals that people are familiar with, a seal was chosen for Paro because they are not very well known to people, and the robot cannot be compared with a real seal. That makes it easier for people to accept the robot.
It has been confirmed through research and verification at many nursing care facilities and pediatric wards that robot-assisted therapy using Paro has the same effect as animal-assisted therapy.

Caiba Inc.
Telexistence robot“ caiba”

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.

③Hands-on computer programming experience area

This is the hands-on computer programming experience area. In 2020, computer programming will be made a compulsory subject for learning in Japanese elementary schools.
This area was created with the objective of generating interest in computer programming and helping students feel it as something close to their lives.
The exhibits are intended for children of all ages, from elementary through senior high school.

④Technology Lab　2F

●TEPIA Challenge Support Program

This floor contains an exhibit of original robots developed by junior and senior high school students through the TEPIA Challenge Support Program .
The Support Program is a project that assists the development of robots by junior and senior high school students. Teams, selected from among applications received from throughout Japan, set challenges, design robots, and carry out programming and robot production to develop a completely original robot. They are made in accordance with a different theme that is set each year.
Participating teams are of differing skill levels, from students challenging robot development for the first time, to students attending schools that are regulars at competitive robot contests ("Robocon").

●Video library/Theater room

This floor also has a theater where you can watch videos about Japan's advanced technology and a video library.