

# Innovative Technologies

Ministry of Economy, Trade and Industry (METI) has conducted “Innovative Technologies” this year as part of “Content Technology Innovation Promotion Project” in order to find and evaluate excellent Japanese content technologies.

This project is to find and evaluate advanced technologies expected to contribute greatly to the growth of the content industry, share them at the place of collaboration with industries and universities, and disseminate them to the community, based on the scenario of technological development stated in the “Technological Strategy Japan 2012 (Content Field),” compiled by METI.

22 leading-edge technologies have been selected from 86 entries from industries, research institutes, and universities through a fair evaluation process. The selected technologies are exhibited and demonstrated at “Digital Content Expo 2012” to be held from Thursday, October 25, to Saturday, 27 as one of official events of CoFesta (Japan International Content Festival).

◆Review Committee Members:

<Evaluation committee consisting of experts of content technology from industry and academia>

## Committee Members for Innovative Technologies

### Review Committee

Masahiko Inami  
Toshiyuki Inoko  
Satoshi Endo  
Shunichi Kajisa  
Takashi Kawai  
Yoichiro Kawaguchi  
Akihito Tsukioka  
Michitaka Hirose

Special Award Selection Committee consisting of experts from industry and academia different from the above Review Committee will select four Special Awards including “Industry,” “Culture,” “Human,” and “Ecology,” from the 22 selected technologies on October 25 at Digital Content Expo.

- List of Innovative Technologies Award recipients
- The detail of the selected technologies
- List of Special Award Selection Committee members

## Innovative Technologies adopted list (1/ 2)

01	<p>“Whirled Worlds”: twirling interface for “mobile ambient,” “practically panoramic” whole-body entertainment</p> <p>University of Aizu Spatial Media Group; Eyes, JAPAN; GClue</p>
02	<p>Mathematical model for hit phenomena</p> <p>Prof. Akira Ishii, Department of Applied Mathematics and Physics, Tottori University</p>
03	<p>User-friendly Real-time Heart Beat Simulator</p> <p>National Cerebral and Cardiovascular Center Research Institute; Department of Computer Science, The University of Tokyo.; Department of Cardiovascular Medicine, Shiga University of Medical Science; Bio-Research Infrastructure Construction Team, Riken</p>
04	<p>Substitutional Reality: SR</p> <p>RIKEN, Brain Science Institute, Laboratory for Adaptive Intelligence</p>
05	<p>Facial Expression Mimicking Avatar System</p> <p>Mitsukura Laboratory, Department of System Design Engineering, Faculty of Science and Technology, Keio University</p>
06	<p>Integral three-dimensional television</p> <p>NHK (Japan Broadcasting Corporation)</p>
07	<p>MM-Space: Meeting Space Re-Creation for Next Generation Video Conference</p> <p>NTT Communication Science Laboratories</p>
08	<p>New Tactile Feeling Touch Panel (Real tactile feeling)</p> <p>Kyocera Corporation</p>
09	<p>Transparent Prius</p> <p>Graduate School of Media Design, Keio University</p>
10	<p>Agni’s Philosophy</p> <p>SQUARE ENIX CO., LTD.</p>
11	<p>The world’s first Head-Up Display to project augmented reality information in front of the windscreen</p> <p>PIONEER CORPORATION</p>
12	<p>Media block chair</p> <p>teamLab Inc.</p>

## Innovative Technologies adopted list (2/ 2)

13	Human Interface Using Two-Dimensional Signal/Power Transmission Shinoda Laboratory, Department of Information Physics and Computing, Graduate School of Information Science and Technology, the University of Tokyo
14	enchant.js Ubiquitous Entertainment Inc.
15	JECCO: A Tentacle Robot Kawaguchi Lab., University of Tokyo
16	Virtual body technology for reliving the experience of others Tokyo Metropolitan University, The University of Tokyo, NTT
17	Augmented Satiety Hirose Tanikawa Lab., Graduate School of Information Science and Technology, the University of Tokyo
18	DIVE into World Heritage 3D Panasonic Corporation
19	New 3D Broadcast System that is compatible with conventional 2D television set NHK Media Technology, Inc.
20	QUMARION CELSYS, Inc./SoftEther Corporation /vienne Inc.
21	Pinch: an interface for connecting multiple smartphone screens Tokyo University of Technology, School of Media Science
22	Hand-rewriting Tomoko Hashida, Kohei Nishimura and Takeshi Naemura (The University of Tokyo, Naemura Laboratory)

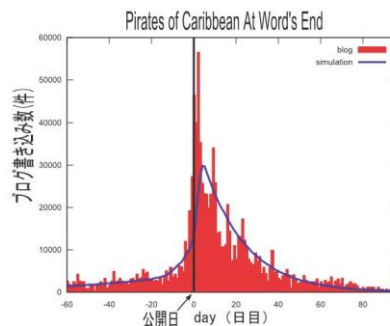
# Innovative Technologies

(01)



Innovative Name	Technology	"Whirled Worlds": twirling interface for "mobile ambient," "practically panoramic" whole-body entertainment
Innovator Name	University of Aizu Spatial Media Group; Eyes, JAPAN; GClue	
Details	<p>We are developing a variety of virtual scenes to support this experience, which allow seamless switching among the avatars and their locales, including setting, costume, actor, and prop. This "exertoy" or "exergame" represents an active interface, a physical interface for whole body interaction. Its groupware capabilities encourage social interaction through physical play, as a novel controller for musical renderer. It's a "come as you are" mo-cap-style interface, requiring no special markers or clothing. Direct manipulation gives immediate multimodal feedback, with intimate linkage between control and display, in either static (pointing) or dynamic modes (spinning and whirling).</p>	

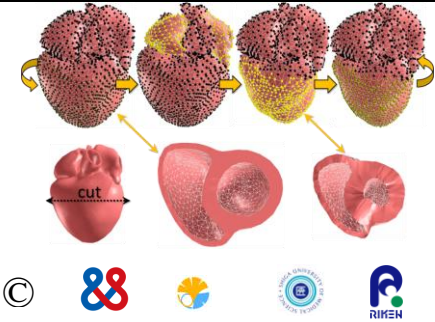
(02)




Innovative Name	Technology	Mathematical model for hit phenomena
Innovator Name	Prof. Akira Ishii, Department of Applied Mathematics and Physics, Tottori University	
Details	<p>To configure as a "mathematical model for hit phenomena" quantitative measurements of advertising, news coverage and media costs for each day projected before and after the release of a movie, advertising periods and "word of mouth" such as blogs as well as frequency of recommendation by acquaintances. Forecast trends in the numbers of viewer mobilization agreed with the box-office results in 25 movies, including US movies such as "Avatar" and "Spider-Man 3", and Japanese movies such as "Always: Sunset on Third Street", thereby succeeding in predicting the "hit" level of a movie to a considerable degree of accuracy. Further, the relativity of the number of blog entries, the number of viewer mobilizations, and sales were also pinned down. Using this mathematical model, it is possible to forecast not only movies, but also applications to other fields are possible, such as being able to predict the possibility of success for a regional event such as the World Sand Sculpture Festival, which started in 2009, predictions of the number of visitors to Mizuki Shigeru Road, the hit of "Taberu Rayu (edible chili sauce)", the results of the 2010 election to the House of Councillors, and the order of the AKB selection general election. Using the mathematical model enables the optimum timing for a company to launch its advertising budgets to be known, and to accurately refine its marketing strategy without relying on experience or instinct. It is possible to achieve maximum effect with limited advertising budgets. An English paper was published in a scientific journal in June 2012, and has been covered by over 200 media organizations worldwide.</p>	

## Innovative Technologies

(03)

	
<b>Innovative Technology Name</b>	User-friendly Real-time Heart Beat Simulator
<b>Innovator Name</b>	National Cerebral and Cardiovascular Center Research Institute; Department of Computer Science, The University of Tokyo; Department of Cardiovascular Medicine, Shiga University of Medical Science; Bio-Research Infrastructure Construction Team, Riken
<b>Details</b>	<p>The heart is the organ whose role is as a pump to circulate blood throughout the body. The structure of the heart is highly complex, and its operations (heartbeat) in three dimensions cannot be explained skillfully using simple illustrations and videos. Simulation technology is useful in depicting this as easily comprehensible 3D video. Heart simulators based on existing mechanics models require major calculations using supercomputers, and initially it was impossible for ordinary users at the PC level. This system aims to reduce the calculation volume by applying CG technology, and to calculate and recreate heartbeats in real time using an ordinary notebook PC. Currently, the heart model is divided into approx. 7,000 parts, and each part contains standard heartbeat data beforehand, but sick hearts, such as with myocardial infarction, can also be created comparatively easily by changing the conditions. Further, the user can operate the mouse to observe a beating heart from all angles, and view the function of heart cross-sections cut out using the mouse. Its use in supporting communications between medical staff and supporting medical education is also expected, in addition to being used as an application for doctors to make explanations to patients.</p>

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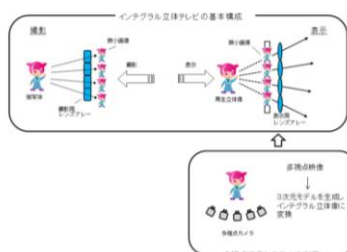
	
<b>Innovative Technology Name</b>	Substitutional Reality: SR
<b>Innovator Name</b>	RIKEN, Brain Science Institute, Laboratory for Adaptive Intelligence
<b>Details</b>	<p>The Substitute Reality (SR) system is a new platform that enables images recorded and edited in the past to be experienced as "reality occurring now before your very eyes". "The Matrix" and "Inception" exist as SF movies that use SR conditions as their motif, but the creation of SR conditions has been technologically vexing until now. The SR system eliminates the borders between the past and reality by rendering past images undetectably and seamlessly from reality to achieve an experience as if everything is right in front of your eyes. This SR system conceals various possibilities as a new experiential platform. Image displays to date have stopped at the level of watching and listening, and even when watching TV and movies, there is almost no sense of you personally experiencing this in reality. The impact of the audio-visual experience through the SR system, however, is clearly different compared to AV content to date. In other words, the SR system can change the nature of these content experiences and, in opposition to existing VR and AR "virtualization approaching reality", interweave the past and the present to be a technology that enables the subjective "reality" itself experienced by the user to be manipulated.</p>

(05)



Innovative Technology Name	Facial Expression Mimicking Avatar System
Innovator Name	Mitsukura Laboratory, Department of System Design Engineering, Faculty of Science and Technology, Keio University
Details	<p>The research group of associate professor Yasue Mitsukura in the Faculty of Science and Technology at Keio University presented a method for predicting head postures and recognizing expressions in real time using a single USB camera. Further, they have also developed an avatar system that enables the real time manipulation of facial orientation and expressions as an application using these technologies.</p> <p>The requirement of special equipment for character motion generation in creating CG animations such as for games and movies is a problem. This research has developed a method of calculating at fast speed and highly accurately changes in human facial orientation and expressions using an ordinary PC and USB camera to enable its application to systems rich with practicality. Consequently, this enables character manipulation in real time, and also enables the development of simple avatar systems in which the characters can be manipulated easily by anyone without the need for special equipment.</p>

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Innovative Technology Name	Integral three-dimensional television
Innovator Name	NHK (Japan Broadcasting Corporation)
Details	<p>Integral three-dimensional televisions are based on the principle of integral photography developed as stereograph technology. To acquire the direction and intensity of the light beams emitted from the subject, the photography uses a lens array along which numerous micro lenses are aligned. During the display, stereographs are created by recreating light beams equivalent to those that were emitted by the subject using a similar lens array to that used during the photography. On this occasion, a display device will be exhibited with a lens array of 182 horizontal and 140 vertical micro lenses with a diameter of 2.64mm, and an LCD with 3840 horizontal and 2160 vertical pixels. It is possible to display subtitles and CG superimposed on actual stereographs, and to implement processing to suppress color distortion concomitant with collection differences between optical systems to create a more easily viewable stereograph. Further, stereographs created from 3D models of the subjects comprising multiple image viewpoints photographed using multiple cameras will also be exhibited.</p> <p>In future, research will progress into photography to create more high-quality stereographs, the development of display technologies, and the diversification of stereograph creation technology, etc.</p>

# Innovative Technologies

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Innovative Technology Name	MM-Space: Meeting Space Re-Creation for Next Generation Video Conference
Innovator Name	NTT Communication Science Laboratories
Details	<p>As a significant step toward next-generation video conferencing, MM-Space re-creates the conversation space of remote multiparty meetings; it appears that the remote participants are talking in front of you. MM-Space consists of multiple projectors and transparent screens. Each screen displays the life-size face of a different meeting participant, and they are spatially arranged to recreate the actual scene. The key feature of MM-Space is a new representation scheme/device that physically links screen motion to human head motion. Specifically, the screen pose is dynamically controlled to emulate the actual head motions of the participant, which are measured with visual face trackers. The head motions express important nonverbal information in conversations, such as gaze direction and head nodding/shaking. The physically augmented screen movement can boost viewers' understanding of the meeting interactions such as "who is talking to whom". In addition, the projection of the background-removed human figures enhances the presence of remote people, such that they appear to be actually in the same place.</p>

(08)




Innovative Technology Name	New Tactile Feeling Touch Panel (Real tactile feeling)
Innovator Name	Kyocera Corporation
Details	<p>Currently, various equipments have "recognition function of touch" by vibration. However, a tactile feeling on flat and hard panel as if were touching a real key could not have been realized yet. This time, Haptic technology(Tactile feeling technology) that an illusion by stimulating finger nerve makes human have real tactile can be realized for the first time by using touch panel and piezo. But only by vibration, it is not possible to create real feeling which makes human perceive "pressure feeling" and "tactile feeling" in touch.</p> <p>Then, we make piezo take vibration and pressure detection function, and integrate and create "vibration", "pressure detection", and "timing control" to/by one control module so that the real feeling can be realized.</p> <p>Moreover, not only real key feeling but also, various feeling, ex, "soft, hard, jelly type" key feeling can be created too.</p> <p>From now, this would be applied to increasing touch panel equipments, but is located only in first entrance of "Tactile feeling creation".</p> <p>We would like to create all tactile feelings for user interface by this trigger and R&amp;D from now.</p>

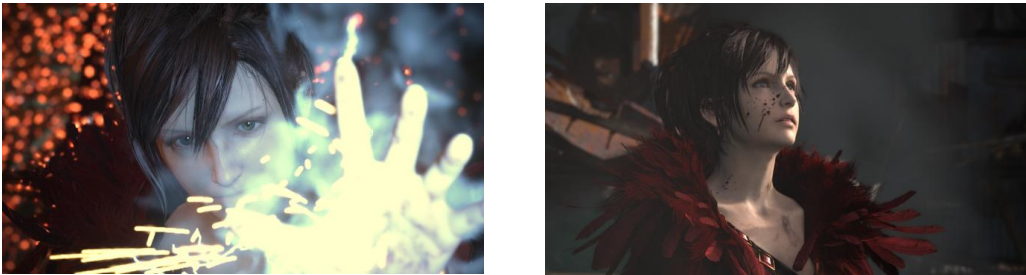


## Innovative Technologies

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Innovative Technology Name	Transparent Prius
Innovator Name	Graduate School of Media Design, Keio University
Details	<p>This system enables a driver to see the rear of the vehicle, which seems visible from the rear seats, by mounting optical camouflage technology to a Prius. In this way, visibility at the back of the vehicle is improved to enable obstacles that would normally be in the blind spot and not visible to be checked easily.</p> <p>This system is highly unique from the point that it does not display surrounding images on a small screen within the vehicle, but enables viewing at actual size of the surrounding environment from a position of actual existence on the issue of improving safety in the environment around the vehicle. Using this system is expected to improve the sense of safety as well as actual safety while driving by greatly reducing driver blind spots and further promoting ergonomics between the driver and the vehicle.</p> <p>Further, the retro-reflective projection technology used in this research is a unique research first proposed by our research group, and as we are proceeding with acquiring the rights to the relevant technologies both in Japan and other countries, its technological uniqueness is also great.</p>


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Innovative Technology Name	Agni's Philosophy
Innovator Name	SQUARE ENIX CO., LTD.
Details	<p>The development of real time CG imaging technology and improvements in graphics board performance in recent years has been eye-opening, and their quality has risen to the level of challenging the quality of pre-rendered CG images.</p> <p>With the "Agni's Philosophy - FINAL FANTASY REALTIME TECH DEMO" product, first the CG imaging department creates high-quality pre-rendered CG image products, and the data is then converted to real-time CG images using the "Luminous Studio" game development environment under development by Square Enix. This product opens up the possibility of having real time CG images.</p>




## Innovative Technologies

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<b>Innovative Technology Name</b>	The world's first Head-Up Display to project augmented reality information in front of the windscreen
<b>Innovator Name</b>	PIONEER CORPORATION
<b>Details</b>	The "world's first AR HUD unit", which displays AR information, is mounted to its installation site on a vehicle's sun visor and displays images equivalent to 37 inches (90 x 30cm) at approx. 3m from the driver's eyes, superimposed on the actual landscape. As information necessary for guidance, such as routes and crossroads where a turn is required, can be displayed projected onto the road in front of your eyes, intuitive guidance is possible. Further, using lasers that are characterized by high luminosity and high contrast on the light source improves visibility, and enables the prompt verification of various information necessary for driving and, in addition, enable a great reduction in time for focusing on perspective and moving the line of sight compared to checking satnav screens mounted to the dashboard to enable a safer and more pleasant drive to be enjoyed.

(12)

	
<b>Innovative Technology Name</b>	Media block chair
<b>Innovator Name</b>	teamLab Inc.
<b>Details</b>	Media Approach consists of 3 male connection, and 3 female connection light cube chairs. The cube, or block, is a standalone chair. The female and male blocks can be joined together to make a bench, furniture or a wall. When the blocks are joined together information passes from the male block to the female and the color of the female block changes. Freely join the blocks to change the design and color of the space. The action of changing the function of the space changes the space, and the action itself also changes the space, giving enjoyment. This is the concept of "New Value in Behavior".

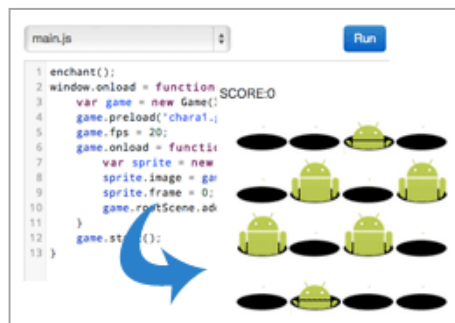
# Innovative Technologies

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Innovative Technology Name	Human Interface Using Two-Dimensional Signal/Power Transmission
Innovator Name	Shinoda Laboratory, Department of Information Physics and Computing, Graduate School of Information Science and Technology, the University of Tokyo
Details	Two-dimensional signal/power transmission is a technology that locks the electromagnetic waves in a thin sheet medium, and sends the signals and electric power selectively to an adjacent coupler. The power and signals can be sent without separate wires to a terminal equipped with a special coupler that is bound to the adjacent transmission sheet, and the general medium adjacent to the sheet is not drenched in a strong electromagnetic field. Further, the sheet configuration is simple, and can be incorporated into desktop surfaces using construction with inexpensive materials. Enabling such a wireless and selective supply of power, and signal transmissions that do not interfere with the external space, enables the addition of human interface functions to various media in contact with people during their daily lives. Specifically, this supplies a human support system with embedded interaction functions with human, and the display of information in real time on items of daily use and on desktops to improve work efficiency while using multiple sheets of e-paper.


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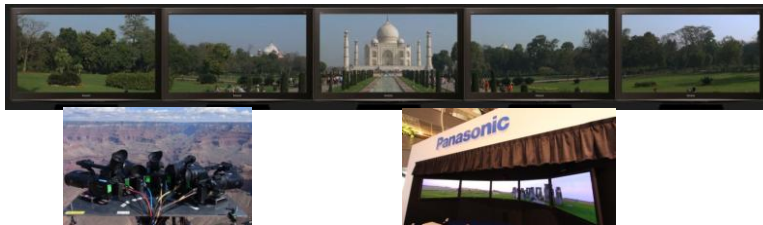
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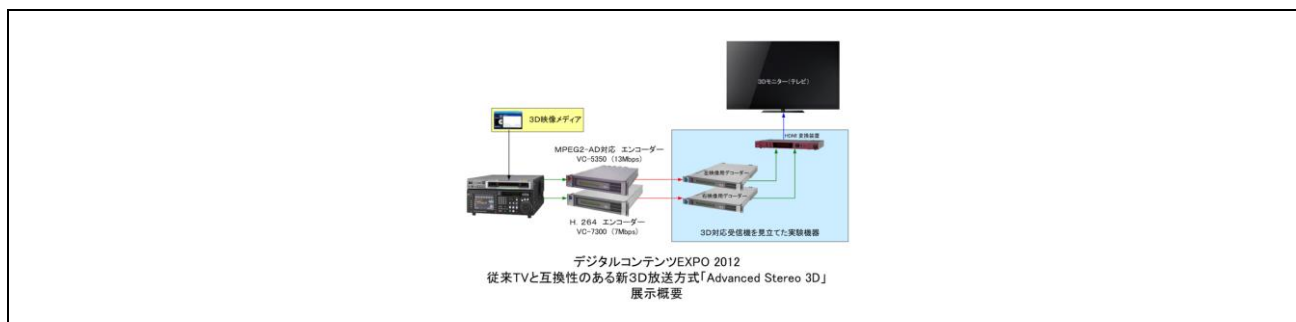
Innovative Technology Name	enchant.js
Innovator Name	Ubiquitous Entertainment Inc.
Details	We will exhibit and demonstrate hardware that is compatible with enchant.js, such as notebook PCs, tablets, and smartphones. Further, we are also scheduled to give a programming demonstration using the "Maeda block" programming environment. In addition, we are also scheduled to exhibit similar panels to those of the enchant.js workshops for children held in Los Angeles.

 <p style="text-align: center;">©Yoichiro Kawaguchi</p>	
Innovative Technology Name	JECCO: A Tentacle Robot
Innovator Name	Kawaguchi Lab., University of Tokyo
Details	<p>Chukurage is a product that displays CG art using cutting-edge robot technology. We tested robot jellyfish tentacles based on biological principles. The tentacles of the Chukurage robot, which comprises wires, springs, and metal plates, move like the real tentacles of a living organism when the three wires are pulled. The expressiveness is great, close to the mechanism of the tentacles of a living organism. Further, the Chukurage robot also has proximity sensors to enable interaction with humans. When a person approaches, the tentacles start to move as if awoken. The method that we propose is expected to be effective in improving visitor satisfaction with interactive art products.</p>

 <p style="text-align: center;"> <small>五感提示によるバーチャル身体技術</small>  <small>2012 首都大学東京、東京大学、NTT (funded by NICT)</small> </p> <p style="text-align: center;">本技術は、情報通信研究機構の支援により開発されています。</p>	
Innovative Technology Name	Virtual body technology for reliving the experience of others
Innovator Name	Tokyo Metropolitan University, The University of Tokyo, NTT
Details	<p>Virtual body technology is technology that enables vicarious experiences to be enjoyed pseudoactively by recording the actions of other people and replaying them to the five senses. These comprise technologies concerned with the following:</p> <ol style="list-style-type: none"> <li>1) The simultaneous supply of multi-sense information</li> <li>2) The interaction of multi-sense information</li> <li>3) The evocation of a sense of active movement, etc.</li> </ol> <p>Multi-sense information is information concerning sense groups including smell, vestibular sensations, haptics, and wind sensations, in addition to the visual and auditory sensations used hitherto. Supplying all these simultaneously is different from characteristics of receiving each information individually, and supply is implemented with consideration of such interaction. 1) and 2) are technologies that reproduce the ambient environment of the experimenter with a high degree of actually being there, but in addition, 3) implements expressions concerning the dynamic sense of movement of the experimenter themselves. This technology aims to acquire a sense of reality as if your own body was undergoing the experience following your wishes dynamically, while using the experience information of other people that has been recorded. The body of the experimenter is virtualized, so for example, the dynamic physical movement status of another person walking is experienced vicariously and pseudoactively. In this way, vicarious experience is enabled while enjoying a sense of actually being there of the situation when going to various locations and walking.</p>

	
Innovative Technology Name	Augmented Satiety
Innovator Name	Hirose Tanikawa Lab., Graduate School of Information Science and Technology, the University of Tokyo
Details	<p>"Augmented satiety" is a system that enables a sense of a full stomach to change meal quantities while remaining fixed by manipulating the sense of a full stomach acquired when eating simply by manipulating the size of the portion appearance while maintaining the size of the surroundings through a sense of real expansion. In recent years, it has been realized that the sense of a full stomach acquired from meals is greatly affected by the surrounding conditions at the time of the meal, such as the number of fellow diners and the presentation and appearance, and not just volume along. From this knowledge, we thought it was possible to manipulate the amount of food ingested by changing perception of the elements that contribute to a sense of a full stomach without changing the meal itself. The "augmented satiety" system feeds back by changing the visual sense of a portion's volume in real time by focusing on the amount of the meal's appearance. At this time, it is possible to enlarge and contract only the target food while keeping the hands at a fixed size by suitably warping the hands holding the food by using a deformation algorithm. Upon evaluating experimentally the impact the system has on user food ingestion amounts, the results showed that sense of full stomach obtained remained fixed while affecting changes of approx. 10% in both increasing and decreasing the amount of food ingested.</p>

	
Innovative Technology Name	DIVE into World Heritage 3D
Innovator Name	Panasonic Corporation
Details	<p>"DIVE into World Heritage 3D" is a system that multi-records and displays world heritage sites as 3D images with a visual angle of 150° across 5 sources (10 sources left and right) by synchronizing the time codes of five Panasonic integrated twin-lens 3D camera recorders (AG-3DA1) mounted in a fan shape with an open angle of 30°.</p> <p>During display, the playback synchronizes the five sources in the large 3D display of the five Panasonic cameras mounted at the same angle as the open angle set during filming.</p> <p>In consideration of the display frame width also, the stereo design for each 3D image displays the same stereo sense, and naturally continuous images.</p> <p>Each camera films by recording the left and right aspects in high definition, and synchronizing the time codes of a total of ten sources.</p> <p>Further, the audio also creates a video experience space with a sense of being there by incorporating 5.1ch surround sound.</p>



デジタルコンテンツEXPO 2012  
従来TVと互換性のある新3D放送方式「Advanced Stereo 3D」  
展示概要


Innovative Technology Name	New 3D Broadcast System that is compatible with conventional 2D television set
Innovator Name	NHK Media Technology, Inc.
Details	<p>NHK Media Technology, Inc. and NEC present a 3D broadcasting system, "Advanced Stereo 3D (AS3D)", which is compatible with existing 2D receivers.</p> <p>3D broadcasts to date have compressed the two video screens, left and right, into one horizontal screen for broadcasting, and this method not only halves the resolution, but also has the major problem of disabling watching as the left and right images are displayed as two vertical screens when received by 2D receivers, which have hitherto been incompatible with 3D.</p> <p>With this method, existing receivers can receive full specification hi-vision images, and 3D receivers compatible with this method enable full specification 3D hi-vision images to be enjoyed.</p> <p>This method enables improved compression while maintaining existing image quality by making full use of new methods to control compression modes that cannot be used with the existing problems of compression device processing performance (field picture configuration) suited to the image.</p> <p>In this way, when used for BS digital broadcasts, the left image is compressed to approx. 65% of the existing image while maintaining MPEG2 standards compatibility, and the right image is compressed into the remaining 35% of the bandwidth to enable overlap by compression using H.264(AVC) format, which is also used in 1-seg broadcasts.</p>



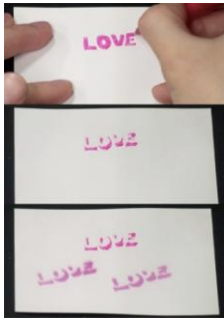
Innovative Technology Name	QUMARION
Innovator Name	CELSYS, Inc./SoftEther Corporation /Vivienne Inc.
Details	<p>QUMA technology is a technology concerned with input devices and control mechanisms. QUMARION was developed to support the creation of illustrations, comics, and character animation based on this technology.</p> <p>32 sensors are mounted to the joints, and operating QUMARION enables 3D software characters to be moved.</p> <p>In this way, 3D character can be manipulated intuitively, which was difficult with existing mouse operations.</p> <p>QUMARION is currently compatible with the following software.</p> <ul style="list-style-type: none"> <li>● Illustration software "CLIP STUDIO PAINT PRO"</li> <li>● Motion creation software "CLIP STUDIO ACTION"</li> <li>● Character editing software "CLIP STUDIO COORDINATE"</li> <li>● Autodesk® Maya/Max plugins</li> </ul> <p>Further, QUMARION SDK enables QUMARION to operate with various software.</p> <p>In the exhibition, there will be demonstrations of QUMARION and other software (illustration creation and motion creation).</p>



## Innovative Technologies (21)

	
<b>Innovative Technology Name</b>	Pinch: an interface for connecting multiple smartphone screens
<b>Innovator Name</b>	Tokyo University of Technology, School of Media Science
<b>Details</b>	<p>We devised a new user interface that relates applications running on multiple mobile devices when the surfaces of juxtaposed screens are merely pinched. The multiple-screen layout can be changed dynamically and instantly even while applications are running in each device. This interface can introduce a new kind of interaction: rearrangement of devices triggers a certain reaction of contents. We expect this interface to show great potential to inspire various application designs, and we expect to enrich the contents by offering interaction that a single display or a static multi-display environment cannot provide. We developed several applications using it. Although these applications are simple prototypes, we believe these applications can demonstrate the interface's potential for producing various new representations and interactions. We are considering applying this interface to offer face-to-face social contents, since one might call friends to bring their devices in order to play the applications.</p>

(22)

	
<b>Innovative Technology Name</b>	Hand-rewriting
<b>Innovator Name</b>	Tomoko Hashida, Kohei Nishimura and Takeshi Naemura (The University of Tokyo, Naemura Laboratory)
<b>Details</b>	<p>When the user writes on a piece of paper with a pen, for example, the Hand-rewriting system can erase what is written on the paper, and additional content can be written on the paper in natural print-like colors. We achieved this hybrid writing and erasure on paper by combining two technical innovations: ThermoErasure and PhotoScription. The first technology can automatically erase specific areas on paper without using an eraser by selectively heating thermochromic ink using a laser. The second can repeatedly display additional content on the paper in color by projecting UV light on paper coated with photochromic material. We kept external stimuli for erasing and displaying separate so that they do not interfere with each other.</p>



## Special Awards Selection Committee

Takashi Ashitomi  
Toshiyuki Ando  
Hiroshi Oonogi  
Masayuki Omori  
Susumu Kusakabe  
Yoshihiro Kuroki  
Kengo Kuma  
Toru Kono  
Yasuhiro Satoh  
Takashi Shoji  
Susumu Tachi  
Toshio Nakagohri  
Shinya Nakajima  
Takeshi Natsuno  
Yuki Ninagawa  
NIWA Tamon Andrew  
Maiko Fukushima  
Yoshiyuki Matsunaga  
Takao Yoshimura  
Takashi Yamaoka