

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD. AND
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioners

v.

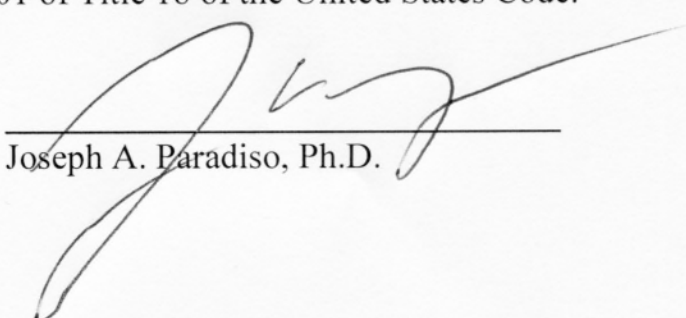
MAXELL, LTD.,
Patent Owner

Inter Partes Review No.: IPR2025-01308

**DECLARATION OF DR. JOSEPH PARADISO IN SUPPORT OF
PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 11,277,650**

I hereby declare under penalty of perjury under the laws of the United States of America that the following is true and correct, and that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I understand that willful false statements are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code.

Date: 16-July-2025



Joseph A. Paradiso, Ph.D.

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1001	U.S. Patent No. 11,277,650.
1002	Declaration of Joseph Paradiso.
1003	File History of U.S. Patent No. 11,277,650.
1004	Certified English Translation of WO 2005/094080 (“Shindo”).
1005	WO 2005/094080 (“Shindo”).
1006	Certified English translation of Japanese Patent App. Pub. No. 2003/208375 (“Sasaki”).
1007	Japanese Patent App. Pub. No. 2003-208375 (“Sasaki”).
1008	U.S. Patent No. 6,680,940 (“Lewin”).
1009	U.S. Patent Pub. No. 2004/0010687 (“Futa”).
1010	U.S. Patent No. 5,619,250 (“McClellan”).
1011	U.S. Patent Pub. No. 2004/0231003 (“Cooper”).
1012	“Wearable Sensing for Dynamic Management of Dense Ubiquitous Media,” Laibowitz, M., Gong, N-W., and Paradiso, J.A., in the Proc. of the Sixth International Workshop on Wearable and Implantable Body Sensor Networks (BSN 2009), Berkeley, CA, June 3-5, 2009.
1013	“Metaphor and Manifestation – Cross Reality with Ubiquitous Sensor/Actuator Networks,” Lifton, J., Laibowitz, M., Harry, D., Gong, N.W., Mittal, M. and Paradiso, J.A., IEEE Pervasive Computing Magazine, July-September 2009 (Vol. 8, No. 3).
1014	“Experiences and Challenges in Deploying Potentially Invasive Sensor Systems for Dynamic Media Applications,” Gong, N-W., Laibowitz, M., and Paradiso, J.A., in Proc. of the Cloud-Mobile Convergence for Virtual Reality Workshop (CMCVR 2010), Waltham MA, March 20, 2010.
1015	“Dynamic Privacy Management in Pervasive Sensor Networks,” Gong, N-W., Laibowitz, M., and Paradiso, J.A., in Proc. of Ambient Intelligence (AmI) 2010, Malaga, Spain, 25-29 October 2010.
1016	“Multimedia Content Creation using Societal-Scale Ubiquitous Camera Networks and Human-Centric Wearable Sensing,” Laibowitz, M., Gong, N-W., and Paradiso, J.A., in Proc. of ACM Multimedia 2010, Florence Italy, 25-29 October 2010.
1017	“Gestures Everywhere: A Multimodal Sensor Fusion and Analysis Framework for Pervasive Displays,” Nicholas Gillian, Sara

Exhibit No.	Description
	Pfenninger, Spencer Russell, and Joseph Paradiso, in Proceedings of the International Symposium on Pervasive Displays, Copenhagen, June 2014.
1018	Musical Zoo, Vimeo (Feb. 12, 2016), https://vimeo.com/155157756 .
1019	Channarukul, S., McRoy, S.W., and Ali, S.S., “MULTIFACE: multimodal content adaptations for heterogeneous devices,” in proc. of ICMI '04, October 13, 2004.
1020	Robertson, S., Whaton, C., Ashworth, C., and Franzke, M., “Dual Device User Interface Design: PDAs and Interactive Television,” in Proc. of the CHI '96 Conference, April 13-18, 1996.
1021	Lippman, A. and Kermode, R., “Media Banks: Entertainment and the Internet”, IBM Systems Journal, Vol. 35, No. 3&4, 1996.
1022	Spinner. Responsive Environments. https://resenv.media.mit.edu/#Projects#spinner .

CHART OF CLAIMS	
[1pre]	A contents reproducing system comprising:
[1a]	a main terminal; and
[1b]	a plurality of subsidiary terminals,
[1c]	wherein the main terminal comprises: a storage storing the contents;
[1d]	[wherein the main terminal comprises...] a first display displaying the contents; and
[1e]	[wherein the main terminal comprises...] a first controller controlling transmission/reception with the subsidiary terminals,
[1f]	wherein the first controller is configured to: store a plurality of device specific identification (ID) information of the subsidiary terminals,
[1g]	[wherein the first controller is configured to...] store a plurality of content information for identifying each of the contents, and
[1h]	[wherein the first controller is configured to...] store association information for transmitting one of the contents to one of the subsidiary terminals,
[1i]	wherein the association information defines that one of the contents identified by the content information is associated with one of the device specific ID information,
[1j]	wherein the plurality of subsidiary terminals comprise: a second display displaying the content; and
[1k]	[wherein the plurality of subsidiary terminals comprise...] a second controller controlling transmission/reception with the main terminal, the second controller storing device specific ID information for identifying the subsidiary terminal and transmitting the device specific ID information to the main terminal when connecting to the main terminal, and
[1l]	wherein, the main terminal determines whether it is possible to connect to the subsidiary terminal storing the device specific ID information, and transmits the content stored in the storage to the subsidiary terminal which can be connected, based on the association information then the subsidiary terminal reproduces the received content on the second display.

CHART OF CLAIMS
[2] The contents reproducing system according to claim 1, wherein the main terminal includes a converter down-converting the content and transmits the down-converted content to the subsidiary terminal.
[3] The contents reproducing system according to claim 1, wherein the main terminal includes a network interface and acquires the content from an external server via the network interface.
[4pre] A contents reproducing system comprising:
[4a] a main terminal;
[4b] first subsidiary terminal; and
[4c] second subsidiary terminal,
[4d] wherein the main terminal comprises: a storage storing the contents;
[4e] [wherein the main terminal comprises...] a first display displaying the contents; and
[4f] [wherein the main terminal comprises...] a first controller controlling transmission/reception with the first subsidiary terminal and the second subsidiary terminal,
[4g] wherein the first controller is configured to: store first device specific identification (ID) information of the first subsidiary terminal and second device specific ID information of the second subsidiary terminal,
[4h] [wherein the first controller is configured to...] store first content information for identifying first content among the contents and second content information for identifying second content among the contents, and
[4i] [wherein the first controller is configured to...] store association information for transmitting one of the first content or the second content to one of the first subsidiary terminal or the second subsidiary terminal,
[4j] wherein the association information defines that one of the first content or the second content is associated with one of the first device specific ID information or the second device specific ID information,

CHART OF CLAIMS
[4k] wherein the first subsidiary terminal comprises: a second display displaying the content; and
[4l] [wherein the first subsidiary terminal comprises...] a second controller controlling transmission/reception with the main terminal, the second controller storing the first device specific ID information for identifying the first subsidiary terminal and transmitting the first device specific ID information to the main terminal when connecting to the main terminal,
[4m] wherein the second subsidiary terminal comprises: a third display displaying the content; and
[4n] [wherein the second subsidiary terminal comprises...] a third controller controlling transmission/reception with the main terminal, the third controller storing the second device specific ID information for identifying the second subsidiary terminal and transmitting the second device specific ID information to the main terminal when connecting to the main terminal, and wherein,
[4o] when the association information defines that the first content is associated with the first device specific ID information and the second content is associated with the second device specific ID information, the main terminal transmits the first content to the first subsidiary terminal and transmits the second content to the second subsidiary terminal, and
[4p] when the association information defines that the second content is associated with the first device specific ID information and the first content is associated with the second device specific ID information, the main terminal transmits the second content to the first subsidiary terminal and transmits the first content to the second subsidiary terminal.

I, Joseph Paradiso, declare as follows:

1. My name is Joseph Paradiso. I have been asked by Petitioners Samsung Electronics Co. Ltd. and Samsung Electronics America, Inc. to provide my expert opinions in support of the above-identified petition for *inter partes* review of U.S. Patent No. 11,277,650 (“’650 patent,” EX1001), challenging the validity of claims 1-4 (the “Challenged Claims”).

2. In summary, it is my opinion that the references cited below render obvious the Challenged Claims. My detailed opinions on the claims are set forth below and summarized in the following chart.

Ground	Claims	Stat. Basis	Prior Art
1	1-4	§103	Shindo
2	1-4	§103	Sasaki
3	1-4	§103	Futa in view of McClellan

3. I am being compensated at my normal consulting rate of \$700 per hour for my time. My compensation is not contingent on the outcome of this proceeding or of any proceedings relating to the ’650 patent.

I. BACKGROUND AND QUALIFICATIONS

A. Qualifications

4. All of my opinions stated herein are based on my own personal knowledge, professional judgment, and analysis of the materials and information I considered in preparing this Declaration. In forming my opinions, I have relied on

my knowledge and experience in designing, developing, researching, and teaching the technology referenced in this Declaration.

5. I am over 18 years of age and, if I am called upon to do so, I would be competent to testify as to the matters set forth herein. I have been informed that a copy of my current curriculum vitae, which details my education and professional and academic experience, is being submitted as Exhibit A. The following provides a brief overview of some of my experience that is relevant to the matters set forth in this Declaration.

6. I have devoted my career to various fields of physical, electrical, and computer science with more than two decades focused on embedded sensing, including wired and wireless sensors, as human-computer interaction evolved with the Internet of Things.

7. I am the Alexander W. Dreyfoos Professor in Media Arts and Sciences at the Massachusetts Institute of Technology (MIT), where I direct the Responsive Environments Group, which explores how sensor networks and embedded computation augment and mediate human experience, interaction and perception. I also have served as a co-director of the Things That Think Consortium—a group of MIT Media Lab researchers and industrial partners focused on the future of embedded computation and sensing. I now serve as our Academic Head.

8. I received my B.S. in electrical engineering and physics *summa cum laude* from Tufts University in 1977. I received my Ph.D. in physics from MIT in 1981. From 1981 to 1984, I conducted post-doctoral research at the Swiss Federal Institute of Technology (ETH) in Zurich, working on sensor technology for high-energy particle physics. From 1984–1994, I was a physicist at the Draper Laboratory in Cambridge, Massachusetts, where, as a member of the NASA Systems and Advanced Sensors and Signal Processing Directorates, my research included spacecraft control systems and sensor technology for both sonar systems and high-energy physics.

9. I joined the MIT Media Lab in 1994. The MIT Media Lab was founded in 1985 to actively promote a unique, multi-disciplinary culture that focuses on research projects joining different technological and academic fields. Initially based around the vision of “Digital Convergence,” a term coined by its founding director Nicholas Negroponte to describe how different kinds of media forms (e.g., publishing, film, broadcast, music, photography, etc.) would converge in common computing platforms, the Media Lab is recognized as a pioneering institution that explored the future of media as it moved from different industries into universal interactive and distributed networked platforms. As technology evolved, researchers at the MIT Media Lab have pioneered areas of technology such as wearable computing, tangible interfaces, and affective computing, along

with early development of standards and technologies used in digital television.

Examples of products or platforms spun off from the Media Lab research include electronic ink readers such as the Amazon Kindle and Barnes & Noble Nook, the popular video game Guitar Hero, the MPEG-4 structured audio format, the first bionic lower-leg system for amputees, wireless mesh networks developed by Nortel, 3D printers manufactured by Formlabs, wearable motion trackers for physical therapy by Figur8, stress and health monitoring systems by Affectiva and Empatica, and the Mercury RFID Reader, commercialized by spin-off ThingMagic.

10. Hundreds of companies, foundations, and organizations have supported the Media Lab's research, including some of the world's leading corporations representing the fields of electronics, entertainment, computer networks, fashion, health care, cloud and mobile computing, smart homes, social media, e-government, greeting cards, toys, and telecommunications, among others. Currently, faculty members, research staff, and students work in circa 25 research groups and initiatives on several hundred projects relating to a broad range of technologies and applications including digital approaches for treating neurological disorders, new approaches to optimizing sustainable cities, self-assembling spacecraft, powering implanted electronics via radio, advancing imaging

technologies that can “see around a corner,” Human interaction with AI, and the world’s first “smart” powered ankle-foot prosthesis.

11. When I joined the Media Lab in 1994, I focused on developing new sensing modalities for human-computer interaction. By 1997, these modalities evolved into wearable and non-wearable wireless sensing and distributed platforms that could monitor, infer, and represent human activity in different ways, evolving into systems that could create, curate, and share digital content across networked displays of various sorts. For example, around the time of the ‘650 patent we developed and deployed a networked array of circa 50 video monitors with embedded sensors that communicated also to wireless devices and controllers (we implemented most as badges or watch form factors). Called “Ubiquitous Awareness Portals” we implemented a variety of applications on them that let users selectively share video and images between them and to interact with different kinds of video content, including controlling playback of a video with controllers on the mobile node, and automatically continuing it on other nearby displays as the user walked around the building (they were tracked by a wearable sensor in communication with the portals). EX1012, 3-8; EX1013, 24-33; EX1014; EX1015, 96-106. One of our mobile devices featured a push button that sent a wireless signal to nearby portals when it was pressed, thereby halting video transmission from the cameras on these portals for a preset length of time,

preventing it from being streamed to other portals or to users browsing the portal data in virtual worlds. Our work on controlling and generating content on networked displays evolved into systems that allowed a user to produce query-driven video streams from sensor-labeled video coming from the portals, as well as systems that display information pertinent to a particular user when they approach, automatically migrating across proximate displays as they navigate through a building or environment. EX1016, 571-580; EX1017; EX1022 (Spinner). In 2011, I developed a system working with Nokia Research, together with some of my students, alumni, and colleagues also working there, to exchange and share video content and audio between a set of mobile devices and fixed displays. EX1018.

B. Technology Background

12. The technology at issue, at the time of the alleged priority date of September 27, 2006 was well known. In particular, each of the components/disciplines involved had been well known.

13. As different kinds of media converged into computing platforms in the 1990s, and these platforms became increasingly networked and encompassed diverse form factors, researchers and inventors explored different ways in which content could be brokered between them. In addition to the patents discussed in this report, there were many examples of systems to broker and stream content from a media storehouse or server to distributed devices with displays – for

example the MULTIFACE system, presented at ICMI (International Conference on Multimodal Interfaces) in 2004, implemented multimodal content adaptations for heterogeneous devices, including various PDAs and mobile devices, sending content that was adapted to their capabilities and different user preferences.

EX1019, 319-320. These kinds of ideas were explored even earlier in the CHI (Computer Human Interfaces) community, for example in 1996 a system was presented to broker information between PDAs and interactive television, demonstrated in a real-estate brokering scenario. EX1020, 79-96. At the MIT Media Lab, sharing and interacting with content across diverse networked platforms has long been a topic that has sparked a wealth of research, starting in the mid-90s, for example, with “The Media Bank,” a flexible platform that would store a wealth of media content of different forms and project it into interactive client platforms of different capabilities with different resolutions. EX1021.

C. Materials Reviewed

14. My opinions contained in this Declaration are based on the documents I reviewed, my professional judgment, as well as my education, experience, and knowledge of the field.

15. In preparing this declaration, I have reviewed and/or considered at least the documents cited in the List of Exhibits, and the documents referenced in this declaration.

II. RELEVANT PATENT LAW AND LEGAL STANDARDS

16. I am not an attorney and offer no legal opinions, but in the course of my work, I have had experience studying and analyzing patents and patent claims from the perspective of a person skilled in the art.

17. For the purposes of this Declaration, I have been informed about certain aspects of the law that are relevant to my analysis, as summarized below.

A. Legal Standards for Prior Art

18. I understand that a patent or other publication must first qualify as prior art before it can be used to invalidate a patent claim.

19. I understand that a U.S. or foreign patent qualifies as prior art to an asserted patent if the date of issuance of the patent is prior to the invention of the asserted patent. I further understand that a printed publication, such as an article published in a magazine or trade publication, qualifies as prior art to an asserted patent if the date of publication is prior to the invention of the asserted patent.

20. I understand that a U.S. or foreign patent also qualifies as prior art to an asserted patent if the date of issuance of the patent is more than one year before the filing date of the asserted patent. I further understand that a printed publication, such as an article published in a magazine or trade publication, constitutes prior art to an asserted patent if the publication occurs more than one year before the filing date of the asserted patent.

21. I understand that a U.S. patent qualifies as prior art to the asserted patent if the application for that patent was filed in the United States before the invention of the asserted patent.

B. Legal Standards for Anticipation

22. I understand that documents and materials that qualify as prior art can be used to invalidate a patent claim via anticipation or obviousness.

23. I understand that, once the claims of a patent have been properly construed, the second step in determining anticipation of a patent claim requires a comparison of the properly construed claim language to the prior art on a limitation-by-limitation basis.

24. I understand that a prior art reference “anticipates” an asserted claim, and thus renders the claim invalid, if all elements of the claim are disclosed in that prior art reference, either explicitly or inherently (*i.e.*, necessarily present).

25. I understand that anticipation in an *inter partes* review must be shown by a preponderance of the evidence.

C. Legal Standards for Obviousness

26. I understand that even if a patent is not anticipated, it is still invalid if the differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person of ordinary skill in the pertinent art.

27. I understand that a person of ordinary skill in the art provides a reference point from which the prior art and claimed invention should be viewed. This reference point prevents one from using his or her own insight or hindsight in deciding whether a claim is obvious.

28. I also understand that an obviousness determination includes the consideration of various factors such as (1) the scope and content of the prior art, (2) the differences between the prior art and the asserted claims, (3) the level of ordinary skill in the pertinent art, and (4) the existence of secondary considerations such as commercial success, long-felt but unresolved needs, failure of others, etc.

29. I understand that an obviousness evaluation can be based on a combination of multiple prior art references. I understand that the prior art references themselves may provide a suggestion, motivation, or reason to combine, but other times the nexus linking two or more prior art references is simple common sense. I further understand that obviousness analysis recognizes that market demand, rather than scientific literature, often drives innovation, and that a motivation to combine references may be supplied by the direction of the marketplace.

30. I understand that if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve

similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

31. I also understand that practical and common-sense considerations should guide a proper obviousness analysis, because familiar items may have obvious uses beyond their primary purposes. I further understand that a person of ordinary skill in the art looking to overcome a problem will often be able to fit together the teachings of multiple publications. I understand that obviousness analysis therefore takes into account the inferences and creative steps that a person of ordinary skill in the art would employ under the circumstances.

32. I understand that a particular combination may be proven obvious merely by showing that it was obvious to try the combination. For example, when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp because the result is likely the product not of innovation but of ordinary skill and common sense.

33. The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a

person of ordinary skill can implement a predictable variation, the patent claim is likely obvious.

34. It is further my understanding that a proper obviousness analysis focuses on what was known or obvious to a person of ordinary skill in the art, not just the patentee. Accordingly, I understand that any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.

35. I understand that a proposed obviousness combination does not need to be the preferred, or most desirable, combination available, in order to render a claim obvious. Instead, there must be something that suggests the desirability of the proposed combination, not necessarily something that suggests that the proposed combination is the most desirable combination available.

36. Similarly, I understand that for purposes of obviousness, when a motivating benefit comes at the expense of another benefit, that does not nullify the proposed obviousness combination or modification. Likewise, a proposed obviousness combination does not fail merely because it may be inferior to other systems used for the same use.

37. I also understand that a determination of obviousness based on teachings from multiple references does not require an actual, physical substitution of elements between the multiple references. Likewise, the test for obviousness is

not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference. Instead, the test is whether a claim is rendered obvious by the teachings of the prior art as a whole.

38. I understand that a claim can be obvious in light of a single reference, without the need to combine references, if the elements of the claim that are not found explicitly or inherently in the reference can be supplied by the common sense of one of skill in the art.

39. I understand that secondary indicia of non-obviousness may include: (1) a long felt but unmet need in the prior art that was satisfied by the invention of the patent; (2) commercial success of processes covered by the patent; (3) unexpected results achieved by the invention; (4) praise of the invention by others skilled in the art; (5) taking of licenses under the patent by others; (6) deliberate copying of the invention; (7) failure of others to find a solution to the long felt need; and (8) skepticism by experts.

40. I also understand that there must be a relationship between any such secondary considerations and the invention. I further understand that contemporaneous and independent invention by others is a secondary consideration supporting an obviousness determination.

41. In sum, my understanding is that prior art teachings are properly combined where a person of ordinary skill in the art having the understanding and

knowledge reflected in the prior art and motivated by the general problem facing the inventor, would have been led to make the combination of elements recited in the claims. Under this analysis, the prior art references themselves, or any need or problem known in the field of endeavor at the time of the invention, can provide a reason for combining the elements of multiple prior art references in the claimed manner.

42. I understand that obviousness in an *inter partes* review must be shown by a preponderance of the evidence.

D. Legal Standards for Means-Plus-Function Limitations

43. I have further been informed of “means-plus function” claim terms. I understand that means-plus-function claiming allows a patentee to claim functionality of an apparatus without reciting a specific structure within the claim itself. Instead, a means-plus-function claim relies on a corresponding structure found in the corresponding patent specification.

44. I understand that construing a claim term as a “mean-plus-function” term involves two analyses. I understand that the first analysis involves determining whether the term is drafted in “means-plus-function” format. I have been informed that a claim term that does not recite “means” is presumptively not a means-plus function term. However, this presumption may be overcome if a POSITA would believe the claim term does not recite sufficiently definite structure

or else recites a function without reciting sufficient structure for performing that function. I further understand that the presumption against means-plus-function treatment may be overcome if the claim limitation uses a generic placeholder (also referred to as a “nonce” word), which is simply a substitute for the term “means.”

45. I have been informed that the words “by means of” does not raise the presumption that the limitation is a means-plus function term.

46. I understand that the second analysis involves identifying the function or functions recited in the claim for the “means-plus-function” term, and the corresponding structure disclosed in the patent specification for performing the claimed function(s).

47. I understand that structure disclosed in the specification qualifies as “corresponding structure” if the intrinsic evidence clearly links or associates that structure to the function(s) recited in the claim. I further understand that where the claim recites multiple functions for the “means-plus-function” term, the specification must disclose corresponding structure to perform all claimed functions.

48. I further understand that, even if the specification discloses corresponding structure, the disclosure must be of adequate corresponding structure to achieve the claimed function. I further understand that a means-plus

function term is indefinite if a POSITA would be unable to recognize the structure in the specification and associate it with the corresponding function in the claim.

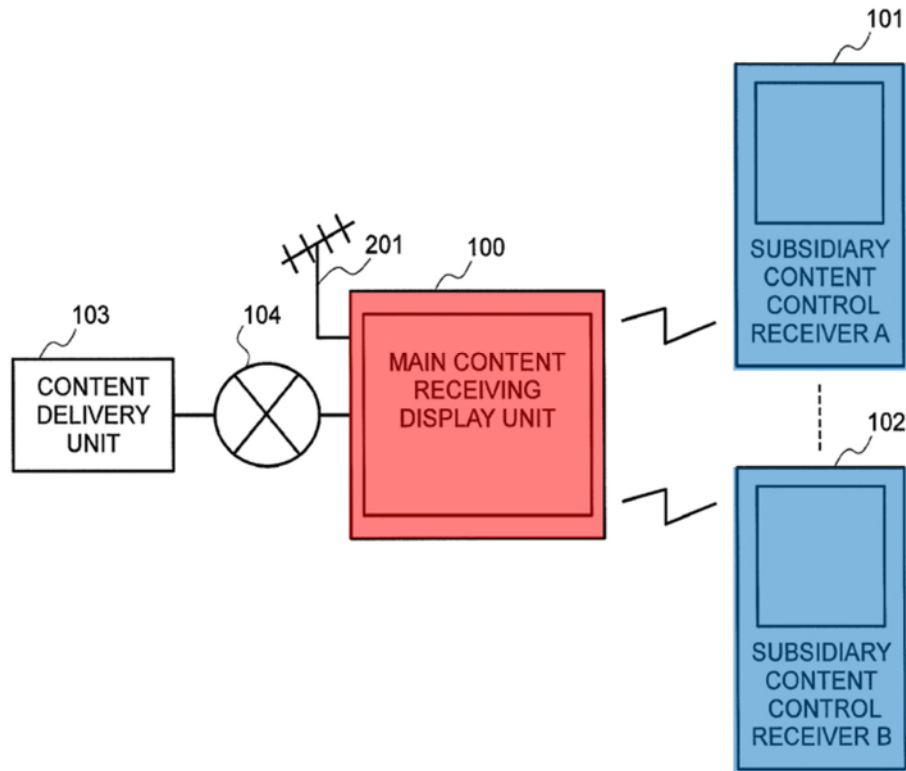
III. THE '650 PATENT

A. Overview of the '650 Patent

49. The '650 patent issued from U.S. Patent Application No. 16/855,012, filed April 22, 2020. I have been informed that the '650 patent claims domestic priority to U.S. Patent Application No. 11/861,390, filed September 26, 2007, and claims foreign priority to Japanese Patent Application No. 2006-261645, filed September 27, 2006. I have been asked to assume that the '650 patent is entitled to a September 27, 2006 priority date.

50. The '650 patent relates to a “content receiving system” for displaying content to a plurality of viewers through the use of a main content receiving display unit 100 (annotated red) and one or more subsidiary content control receivers 101-102 (annotated blue):

FIG.1



EX1001, FIG. 1. The displayed content can include main content and subsidiary content. EX1001, 3:13-16, 17-32. Main content is content displayed via main content receiving display unit 100 that is shared among the plurality of viewers. EX1001, 3:13-16 (“the main content in this embodiment is video content that is displayed on the main content receiving display unit 100, and that can be viewed in common by family member”). Subsidiary content is content that is received by the subsidiary content control receiver from the main content receiving display unit 100 at the request of the subsidiary content control receiver. EX1001, 3:64-4:3 (“subsidiary content control receiver A 101 or B 102 issues an acquisition request

to acquire desired subsidiary content...to the main content receiving display unit 100” which “[o]n the receipt of the acquisition request...the main content receiving display unit 100 transmits the requested desired subsidiary content to the outside), 3:17-22 (“each of subsidiary content control receivers A 101, B 102, which are subsidiary receiving terminal units, is devised to receive desired subsidiary content from the main content receiving display unit 100, and then to display the subsidiary content on the display unit”). The subsidiary content can be, for example, “multilanguage audio data[,]...an electronic program guide used to program recording of a broadcast program[,]...an electronic content table[,]...additional information[,]...content obtained by down-converting the main content...resolution into the SD (Standard Definition) resolution...and/or content information obtained by transforming an encoding method of the main content (for example, by transforming from the MPEG-2...to the MPEG-4)”. EX1001, 3:25-47. In this manner, the ’650 patent allows for an entire family to “enjoy video by use of the main content receiving display unit 100” and for individual members “to individually enjoy the subsidiary content by use of the subsidiary content control receiver that can be possessed by each family member.” EX1001, 4:36-47.

B. File History of the '650 Patent

51. During prosecution, the Examiner issued Office Actions rejecting the pending claims under 35 U.S.C. §103. EX1003, 115-125, 197-210. In response, Applicant filed responses amending the claims. EX1003, 101-114, 181-196. The Examiner then issued a notice of allowance. EX1003, 17-25.

C. Person of Ordinary Skill in the Art

52. In my opinion, a person of ordinary skill in the art at the time of the alleged invention of the '650 patent (September 27, 2006) ("POSITA") would have had a Bachelors' degree in electrical or computer engineering, computer science, or a comparable field of study, plus approximately two or more years of experience with content distribution for or over networked systems or other relevant experience. Additional education could substitute for experience, and industry experience could substitute for formal education.

53. I consider myself to have at least the same level of skill and experience as the POSITA to which the '650 patent is directed.

D. Claim Construction

54. Below are claim constructions that, in my opinion, would have been their ordinary and customary meaning according to a POSITA (person of ordinary skill in the art in question as of September 27, 2006). For all other terms not listed below, I applied the plain and ordinary meaning that a POSITA would have for the terms.

1. “first controller” (claims 1, 4)

55. I have been informed that there is a presumption that the limitation “first controller” does not invoke means-plus function because the limitation does not recite “means.” Therefore, I have applied a plain and ordinary meaning construction of “first controller.”

2. “second controller” (claims 1, 4)

56. I have been informed there is a presumption that the limitation “second controller” does not invoke means-plus function because the limitation does not recite “means.” Therefore, I have applied a plain and ordinary meaning construction to of “second controller.”

3. “third controller” (claim 4)

57. I have been informed there is a presumption that the limitation “third controller” does not invoke means-plus function because the limitation does not recite “means.” Therefore, I have applied a plain and ordinary meaning construction of “third controller.”

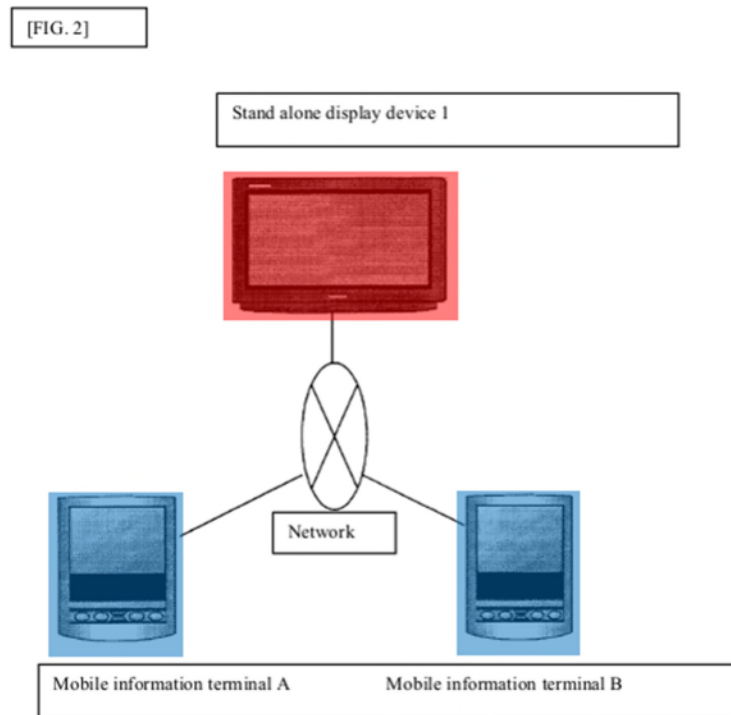
IV. GROUND 1: CLAIMS 1-4 ARE OBVIOUS IN VIEW OF SHINDO

A. Shindo

58. WO 2005/094080 (“Shindo”) was filed March 29, 2005 and published October 6, 2005. EX1004, cover page. Shindo is prior art under at least 35 U.S.C. §§102(a) and (b) (pre-AIA).

59. Shindo generally relates to systems and methods for displaying television content to a main display device and one or more sub-display devices.

EX1004, ¶¶5-6. Figure 2 reproduced below broadly illustrates the core components of Shindo's system:



EX1004, FIG. 2 (annotated). Shindo's system generally includes a main/standalone display device (red) and one or more sub-display devices (blue) that receive content from the main display device. EX1004, ¶19. The main display device "may be a stand alone type display device, a home server, an HDD type accumulation device, a DVD type accumulation device, a personal computer, a TV with a HDD, etc., and may have a broadcast reception unit, an accumulation function, and a display function integrated or combined separately." EX1004, ¶19. Each sub-display device

“may be a mobile information terminal, a mobile phone, a PDA, a personal computer, or a dedicated terminal.” EX1004, ¶19. In operation, Shindo’s main display device accumulates program contents and sends those accumulated program contents to mobile information terminals that have requested playback modes associated with the accumulated program contents. EX1004, ¶¶28-29, ¶¶33-34, ¶37, ¶¶40-41, ¶¶47-49.

60. In my opinion, Shindo is analogous art to the ’650 patent because (1) Shindo is from the same field of endeavor as the ’650 patent and (2) they are both patents in the area of content delivery systems. In addition, Shindo is reasonably relevant to the problem the ’650 patent is concerned with, as shown in my analysis below.

61. Based on my review of the ’650 patent’s prosecution history (EX1003), Shindo appears to have not been considered during prosecution of the ’650 patent.

B. Claim 1

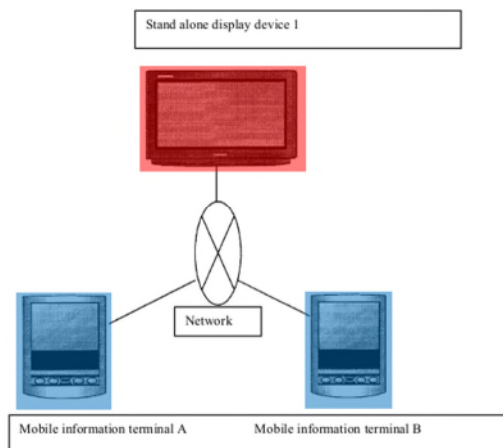
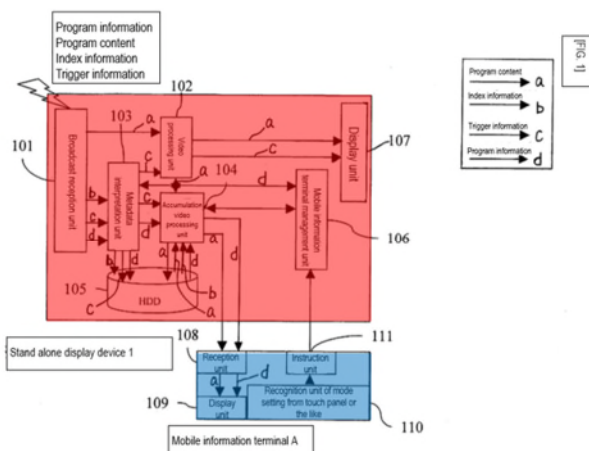
62. In my opinion, Shindo renders this claim obvious.

1. [1pre] A contents reproducing system comprising:

63. In my opinion, Shindo discloses *a contents reproducing system* (collectively, stand alone type display device 1 (i.e., main display device) (red),

one or more of mobile information terminal A and mobile information terminal B (blue)):

[FIG. 2]

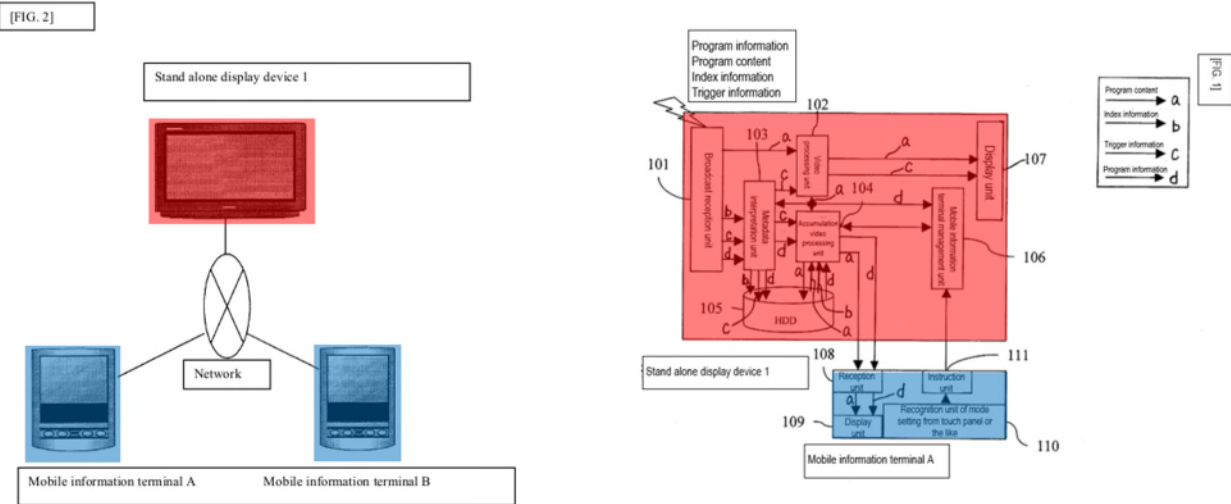


EX1004, FIGS. 1-2, ¶1, ¶19 (“FIG. 1 is a block diagram showing the overall configuration of a linked display system...composed of an accumulation display device as a main display device, and mobile information terminals A and B as sub-display devices that receive program content from the accumulation display device”).

2. [1a] a main terminal; and

64. In my opinion, Shindo discloses *a main terminal* (display device 1).

EX1004, ¶19 (“the overall configuration of this linked display system is composed of an accumulation display device as a main display device” (red)):



FIGS. 1-2 (display device 1).

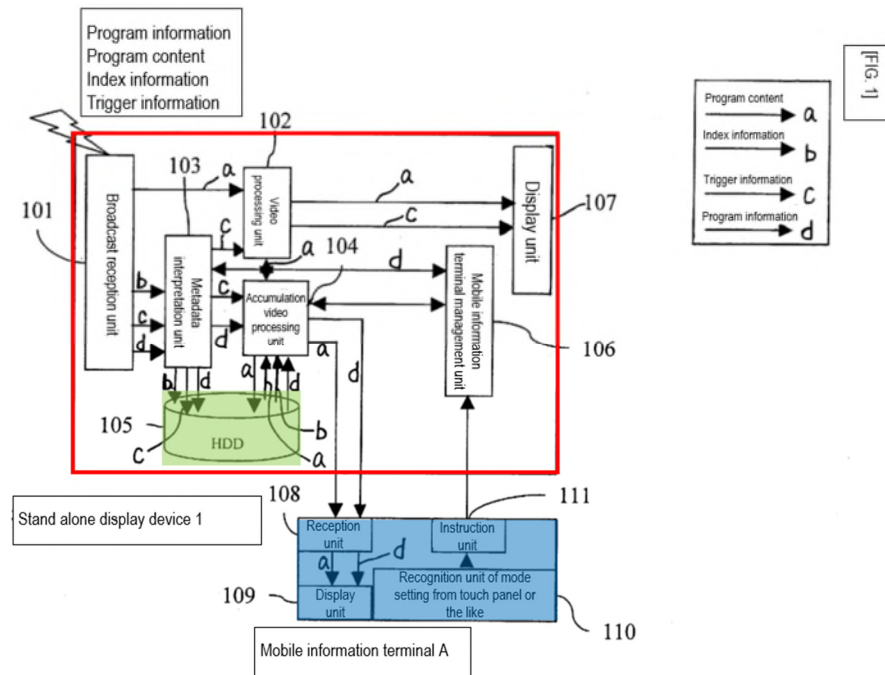
3. [1b] a plurality of subsidiary terminals,

65. In my opinion, Shindo discloses *a plurality of subsidiary terminals* (mobile information terminal A, mobile information terminal B). EX1004, ¶19 (“the overall configuration of this linked display system is composed of...mobile information terminals A and B as sub-display devices that receive program content from the accumulation display device”), FIG. 1 (mobile information terminal A), FIG. 2 (mobile information terminals A-B).

4. [1c] wherein the main terminal comprises: a storage storing the contents;

66. In my opinion, Shindo discloses *wherein the main terminal* (display device 1) *comprises a storage* (HDD) *storing the contents* (program content). EX1004, ¶20, ¶24, FIG. 1.

67. Shindo's display device 1 includes a hard disk drive (HDD) 105 (green) "that is an accumulation means for accumulating the program content or index information." EX1004, ¶20.



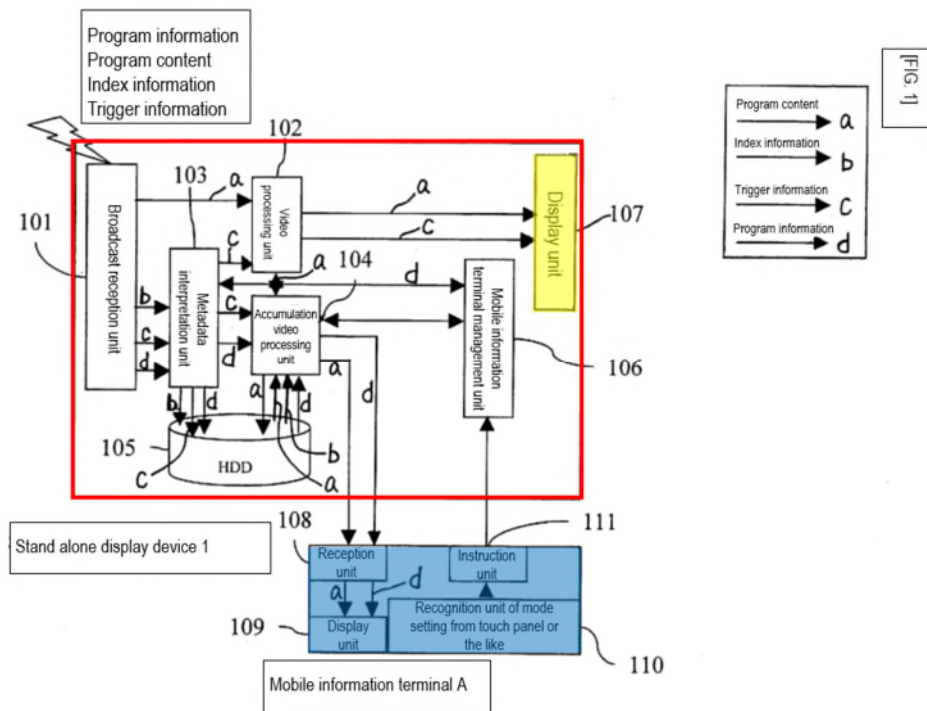
EX1004, FIG. 1. In operation, "video processing unit 102 outputs the program content received by the broadcast reception unit 101 to the display 107 for display, **and also** outputs the program content being viewed to...be accumulated in HDD."

EX1004, ¶24, *see also* ¶24 ("all or any program contents may be accumulated in HDD 105, without being limited to the program contents being viewed"), ¶39, FIG. 1 (HDD 105).

5. [1d] [wherein the main terminal comprises...] a first display displaying the contents; and

68. In my opinion, Shindo discloses *wherein the main terminal* (display device 1) *comprises...a first display* (display unit 107) *displaying the contents* (program contents). EX1004, ¶20, ¶41, ¶44, FIG. 1.

69. Shindo's display device 1 includes a display unit 107 (yellow):



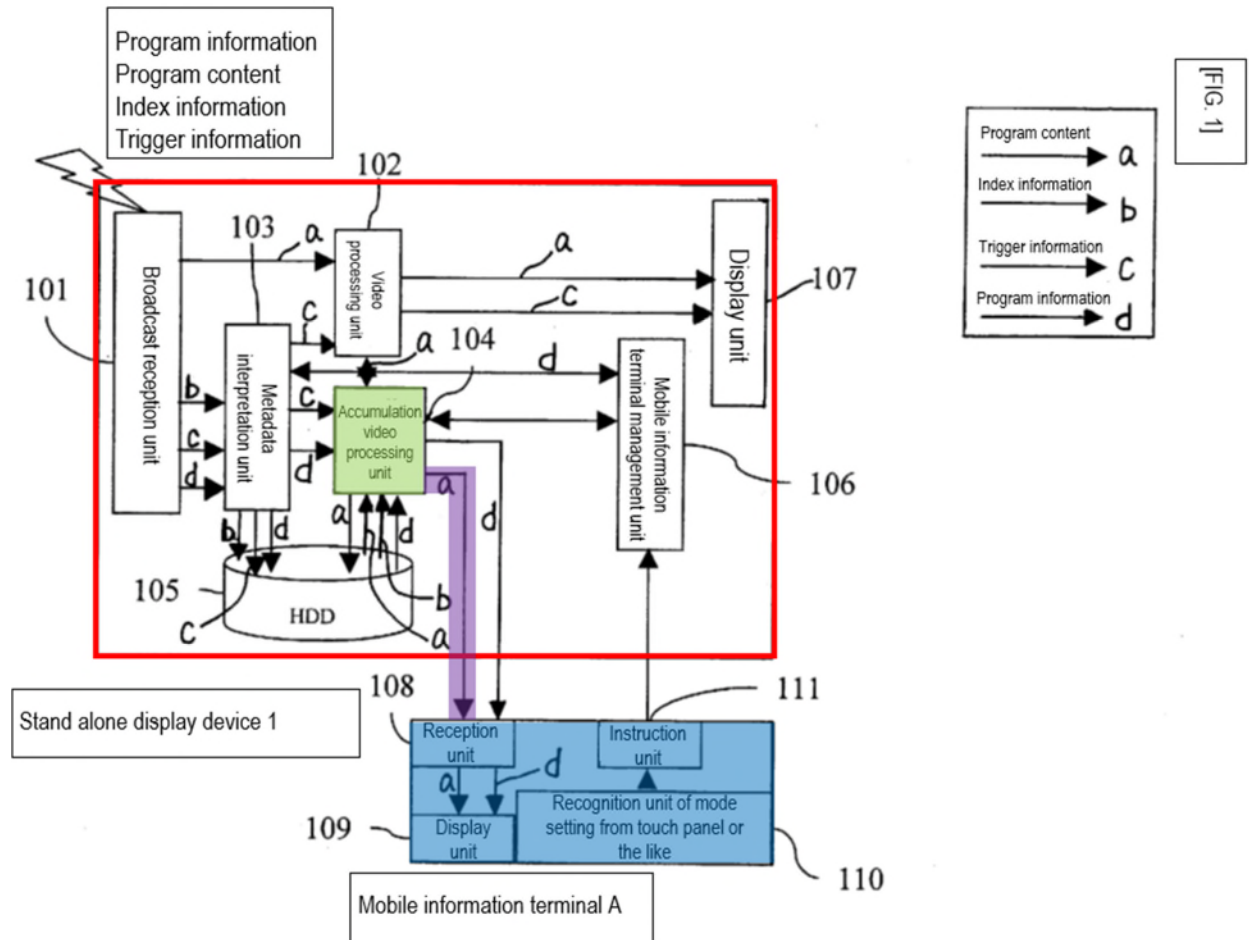
EX1004, FIG. 1 (display unit 107). Display unit 107 “receives input of the program content from the video processing unit 102 and displays it.” EX1004, ¶20, ¶41 (“display unit 107...is assumed to be a display device at the center of a family where multiple people watch”), ¶44 (“It is assumed that multiple viewers are watching a program being broadcast in real time on the stand alone display device 1”).

6. [1e] [wherein the main terminal comprises...] a first controller controlling transmission/reception with the subsidiary terminals,

70. In my opinion, Shindo discloses *wherein the main terminal comprises...a first controller* (collectively, video processing unit 103, video processing unit 104, mobile information terminal management unit 106) *controlling transmission/reception* (transmission of content/receipt of mode information) *with the subsidiary terminals* (mobile information terminals A-B). EX1004, ¶20, ¶¶33-34, ¶37, ¶40, ¶42, FIG. 1.

71. Shindo's stand-alone display device 1 includes a video processing unit 104 and a mobile information terminal management unit 106. EX1004, ¶20. Video processing unit 104 controls transmission of content to the mobile information terminals A-B. EX1004, ¶33 ("the program content and index information are sent directly from HDD 105 to accumulated processing unit 104"), ¶34 ("when the accumulated video processing unit 104 receives program content input from video processing unit 102, it accumulates the program content in HDD 105 for each program...and sends the reconstructed program content to the mobile information terminal"), ¶42 ("mobile information terminal A...receives the input of the reconstructed content from the accumulated video processing unit 104 of the stationary display device 1"). Shindo's FIG. 1 (annotated below) includes signal

lines that represent the transmission of program content from display device 1 to
mobile information terminal A:

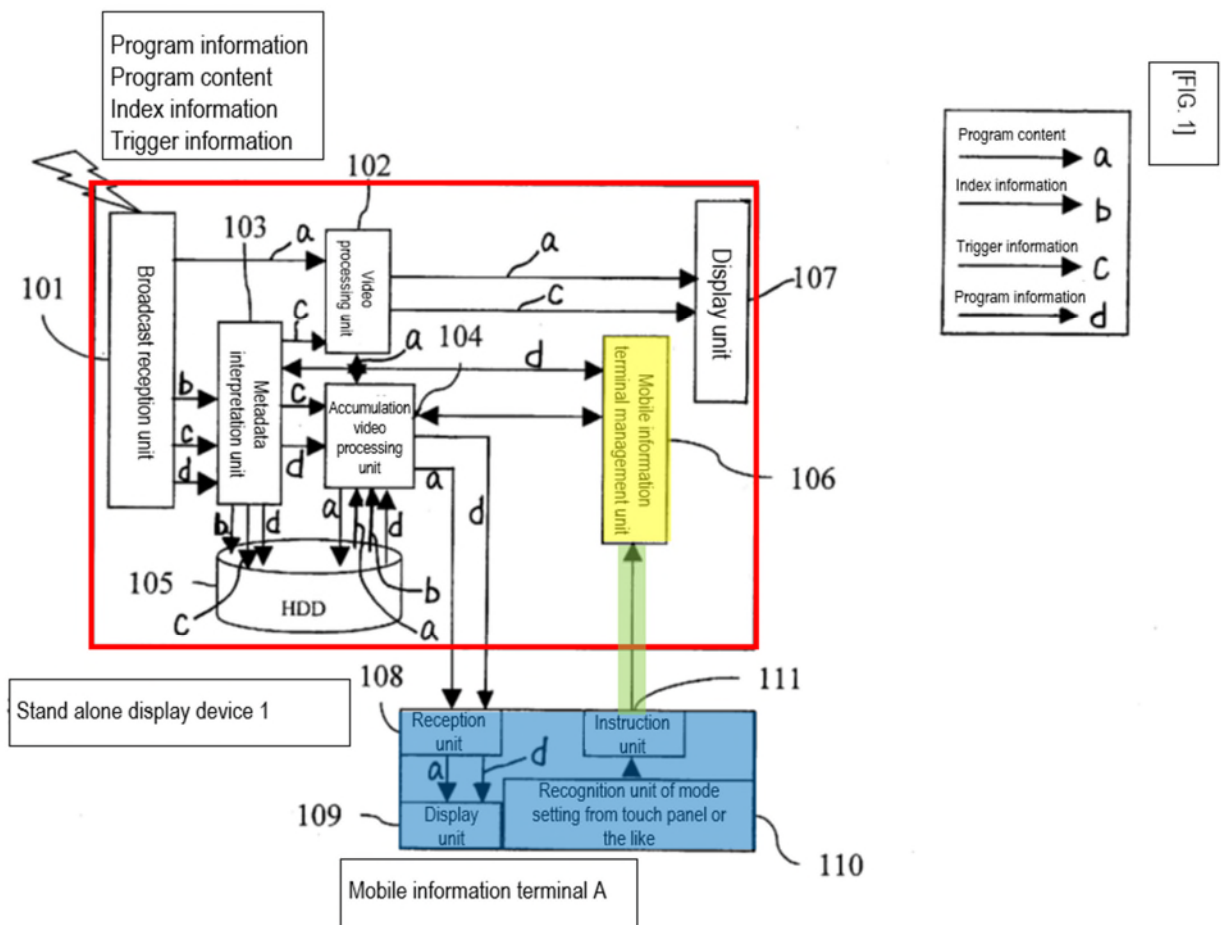


EX1004, FIG. 1. As shown, video processing unit 104 (green) transmits content (purple signal line) to mobile information terminal A (blue).

72. Mobile information terminal management unit 106 controls reception of information from mobile information terminal A. EX1004, ¶20 (“mobile information terminal management unit 106 that manages information on the mobile information terminal to which the reconstructed program content should be

sent”), ¶37 (“mobile information terminal management unit 106 is requested to acquire the status of the mobile information terminal to which the rearranged program content is to be transmitted”), ¶40 (“mobile information terminal management unit 106 accepts a connection request from the mobile information terminal A, establishes a connection, and further accumulates and manages information (management information) of the mobile information terminal A”).

Shindo’s FIG. 1 (annotated below) includes signal lines that represent the reception of information from mobile information terminal unit A:



EX1004, FIG. 1. As shown, mobile information terminal management unit 106 (yellow) receives information (green signal line) from mobile information terminal A (blue).

7. [1f] wherein the first controller is configured to: store a plurality of device specific identification (ID) information of the subsidiary terminals,

73. In my opinion, Shindo discloses *wherein the first controller* (collectively, metadata interpretation unit 103, video processing unit 104, mobile information terminal management unit 106) *is configured to store a plurality of device specific identification (ID) information (terminal ID) of the subsidiary terminals* (mobile information terminal A, mobile information terminal B).

EX1004, ¶40, FIG. 9.

74. Shindo's management unit 106 "accepts a connection request from the mobile information terminal A...and manages information (management information) of the mobile information terminal A." EX1004, ¶40. The management information received by management unit 106 is illustrated in FIG. 9:

[FIG. 9]

		19
20	Terminal ID	1
21	Owner	Taro Matsushita
22	Connection Status	ON
23	User	Taro Matsushita
24	Performance	DisplaySize=2.5 Resolution=345 x 456 encode=mpeg4.wmv.asx
25	Mode Information	Replay

EX1004, FIG. 9. As shown, management information 19 “includes various information such as the terminal ID 20 of the mobile information terminal, the owner’s name 21, information indicating whether the connection status is ON or OFF 22, the user’s name 23, the performance (or function) 24 of the mobile information terminal, and mode information 25.” EX1004, ¶40. The terminal ID 20 is invoked when display device 1 sends content to mobile information terminals A-B in accordance with the mode information associated with the terminal ID.

EX1004, ¶40 (“management unit 106 accepts a connection request from the mobile information terminal A, establishes a connection, and further accumulates and manages information (management information) of the mobile information terminal A” which includes “various information such as the terminal ID 20 of the mobile information terminal...and mode information 25”). In other words, Shindo’s terminal ID 20 is used by display device 1 for identifying the correct playback mode when sending content to the terminal associated with a given

terminal ID. In this manner, in my opinion, the terminal ID 20 constitutes the claimed *device specific ID information*. Furthermore, collectively, in my opinion, the terminal ID, the owner's name, and the user's name can also constitute the claimed *device specific ID information* as the collective nature of the information identifies the mobile information terminal. Moreover, this process is repeated for each of mobile information terminals A-B. EX1004, ¶40. Therefore, in my opinion, Shindo discloses *a plurality of device specific ID information*.

75. In my opinion, Shindo further discloses that the management unit 106 *is configured to store* (accumulate) the terminal IDs 20. EX1004, ¶40 (“mobile information terminal management unit 106 accepts a connection request from the mobile information terminal A, establishes a connection, and **further accumulates and manages information (management information)** of the mobile information terminal A”).

8. [1g] [wherein the first controller is configured to...] store a plurality of content information for identifying each of the contents, and

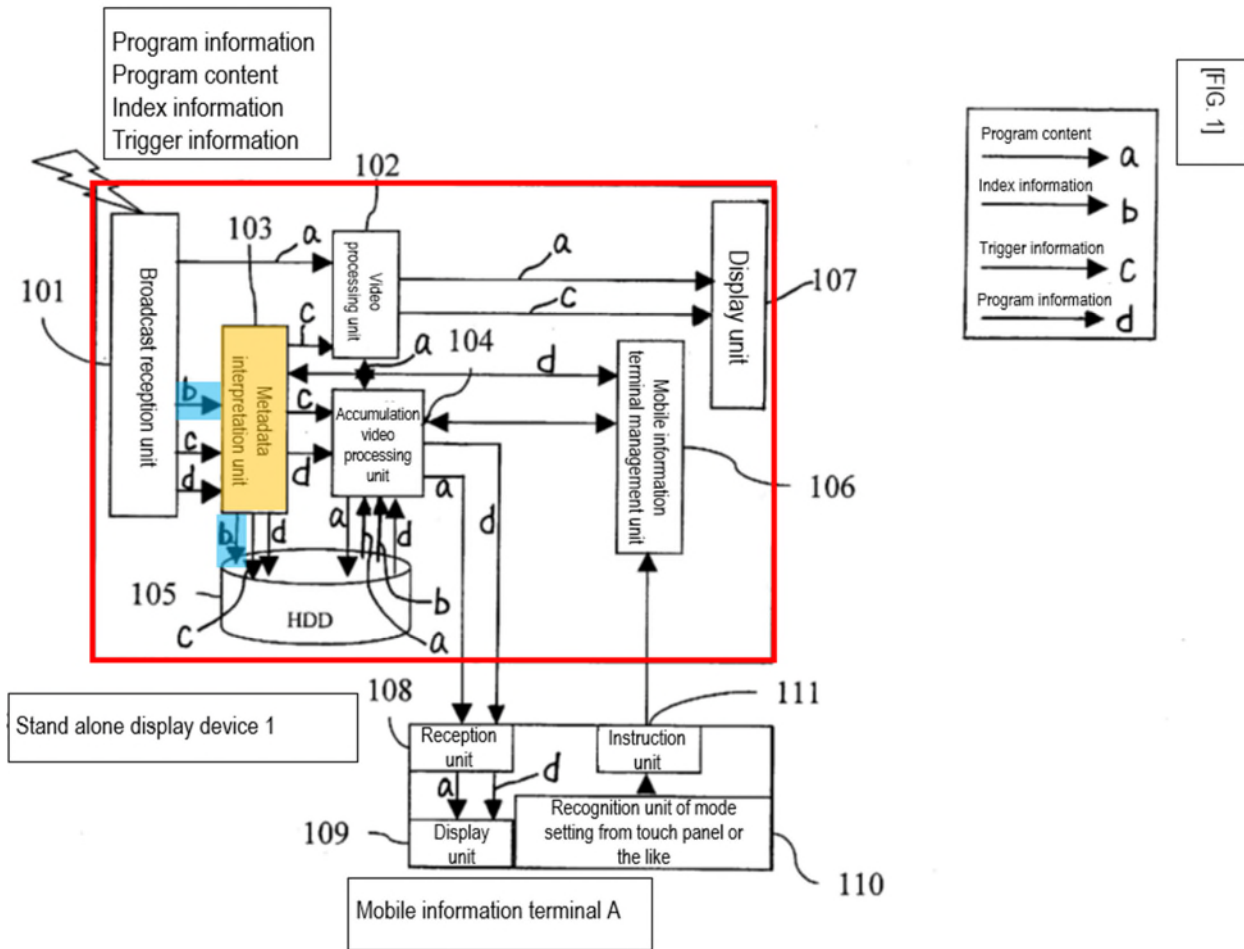
76. In my opinion, Shindo discloses *wherein the first controller* (collectively, metadata interpretation unit 103, video processing unit 104, mobile information terminal management unit 106) *is configured to...store a plurality of content information* (content and index information) *for identifying each of the contents*. EX1004, ¶¶20-21, ¶¶26-27, FIGS. 1, 6.

77. Shindo's system receives index information in addition to the program content. EX1004, ¶20 ("display device 1...receives metadata such as program content, index information...from broadcast waves or a network"). The index information includes a content ID field (blue) that identifies the content the index information corresponds to:

[FIG. 6]

```
<Content ID="200301011700FUJI">  
  <Index ID="001">  
    <starttime>200301011903</starttime>  
    <finishtime>200301011907</finishtime>  
  </Index>  
</Content>
```

EX1004, FIG. 6, ¶21 ("index information here refers to information that specifies a scene of a program, and by specifying the index information, a specific scene of the program can be specified"), ¶27 ("index information 10 has '200301011700FUJI' described as 'ContentID' 11, which is a program ID, and '001' described as an index ID 12"). Shindo's metadata interpretation unit 103 stores the index information in HDD 105. EX1004, ¶26 ("metadata interpretation unit 103 receives input of metadata such as the index information...[and] accumulates the index information in association with the program content accumulated in HDD 105 based on its contents"). Further, FIG. 1 illustrates the signal lines (blue) through which index information is transmitted:

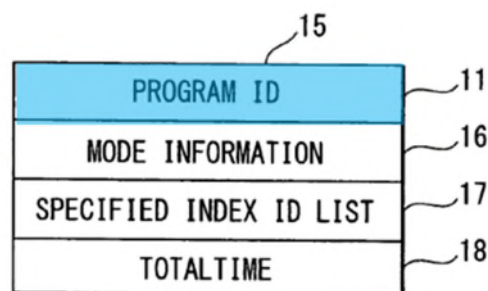


EX1004, FIG. 1. As shown, metadata interpretation unit 103 (orange) receives index information from broadcast reception unit 101 and stores the index information in HDD 105. EX1004, ¶20 (“In FIG. 1, among the alphabetic symbols, a, b, and c attached to some of the signal lines...b (2 places) indicates the signal line through which index information is transmitted”). Moreover, from my review, in my opinion, this process is repeated for each content for which there is index information.

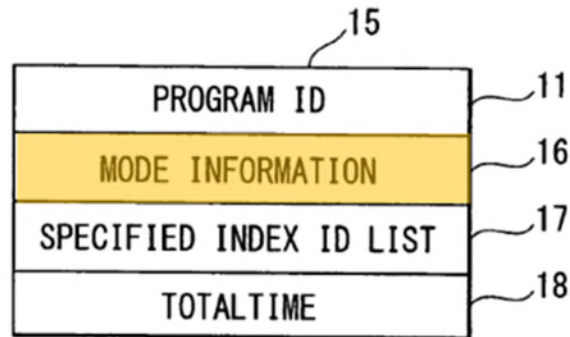
9. [1h] [wherein the first controller is configured to...] store association information for transmitting one of the contents to one of the subsidiary terminals,

78. In my opinion, Shindo discloses *wherein the first controller* (collectively, metadata interpretation unit 103, video processing unit 104, mobile information terminal management unit 106) *is configured to...store association information* (collectively, trigger information, index information, and management information) *for transmitting one of the contents* (one or more scenes of program content) *to one of the subsidiary terminals* (mobile terminal A). EX1004, ¶20, ¶28, ¶¶33-38, ¶57, FIGS. 4, 7, 9.

79. Shindo's system receives trigger information in addition to the program content and the index information. EX1004, ¶20 ("display device 1...receives metadata such as program content, index information, or trigger information from broadcast waves or a network"). The trigger information includes a program field (blue) that identifies the content to which the index information corresponds:



EX1004, FIG. 7; ¶29 (“trigger information 15 includes the program ID 11 for identifying a program (or content) corresponding to the trigger information 15”). The trigger information further includes mode information (orange) that indicates the possible playback modes for that particular program ID 11:



EX1004, FIG. 7; ¶57 (“different mode information exists for each program” and “the operation modes include linked playback, replay playback, highlight playback, chase playback, personal CM playback, previous highlight, and other modes, but these can be freely set according to the program to be viewed and are not limited in any way”), FIG. 15.

80. As I discussed above in §IV(B)(7) (limitation 1f), Shindo’s management unit 106 manages management information associated with a mobile information terminal, which includes mode information (red) that indicates the viewer’s requested playback mode:

[FIG. 9]

		19
20	Terminal ID	1
21	Owner	Taro Matsushita
22	Connection Status	ON
23	User	Taro Matsushita
24	Performance	DisplaySize=2.5 Resolution=345 x 456 encode=mpeg4.wmv.asx
25	Mode Information	Replay

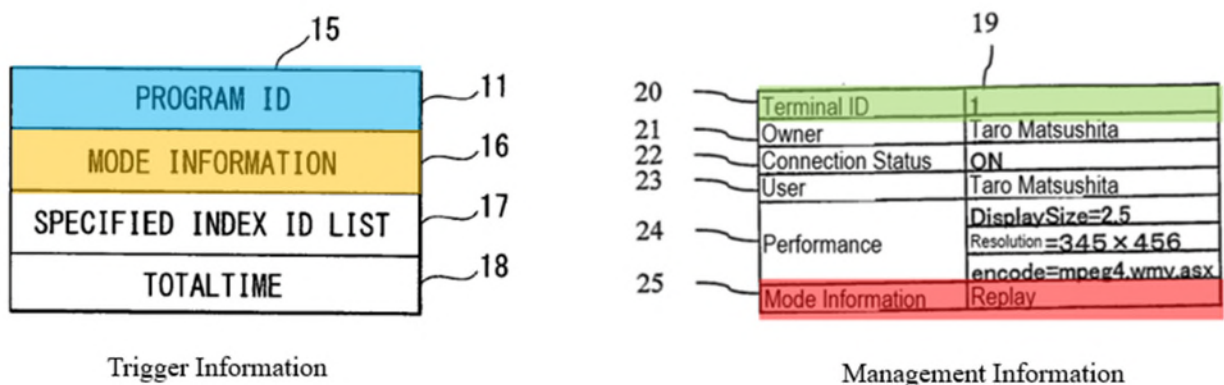
EX1004, FIG. 9. In the example shown in FIG. 9, the requested playback mode is “replay.” In operation, when the trigger information for content is detected, Shindo’s system determines whether there is a mobile information terminal that requested a playback mode supported by or associated with the content by referring to management information 19. EX1004, ¶128 (“metadata interpretation unit 103 first inquires of the mobile information terminal management unit 106 whether there is a mobile information terminal with the same mode information as the trigger information”), ¶133 (“if the received information includes trigger information 15, the trigger information is extracted...the mode information in the trigger information 15 is detected, and the mobile information terminal management unit 106 is inquired as to whether a mobile information terminal with the corresponding mode set exists”).

81. Once Shindo's system determines there is a mobile information terminal that has indicated a playback mode supported by the content, Shindo's system delivers the additional content to the mobile information terminal in accordance with the indicated mode information and index information. EX1004, ¶33 ("If the corresponding mobile information terminal exists, index information 10 is detected based on specified index ID 17 in trigger information...[and] program content is extracted from HDD 105..[and] sent directly from HDD 105 to accumulated video processing unit 104"), ¶34 ("When the accumulated video processing unit 104 receives program content input from video processing unit 102, it accumulates the program content in HDD 105 for each program" and "when trigger information 15, index information 10, and partial program content linked to the index information 10 are input from the metadata interpretation unit, the accumulated video processing unit 104 rearranges the partial content based on the contents of trigger information 15...and sends the reconstructed program content to the mobile information terminal"), ¶¶35-38, FIG. 4. In this manner, in my opinion, the trigger information, index information, and the management information work in conjunction to associate a device (e.g., terminal A or terminal B) with content (e.g., one or more scenes of content for the "replay" playback mode).

10. [1i] wherein the association information defines that one of the contents identified by the content information is associated with one of the device specific ID information,

82. In my opinion, Shindo discloses *wherein the association information* (management information, index information, and trigger information) *defines that one of the contents* (one or more scenes of content) *identified by the content information* (content ID) *is associated with one of the device specific ID information* (terminal ID). EX1004, FIGS. 7, 9.

83. Shindo's association information defines that one of the contents (e.g., one or more scenes of a baseball game) identified by the content information is associated with one of the mobile information terminals by comparing the trigger information, with the management information and the index information. See §IV(B)(9) (limitation 1h). For example, trigger information (left) and management information (right) are provided:



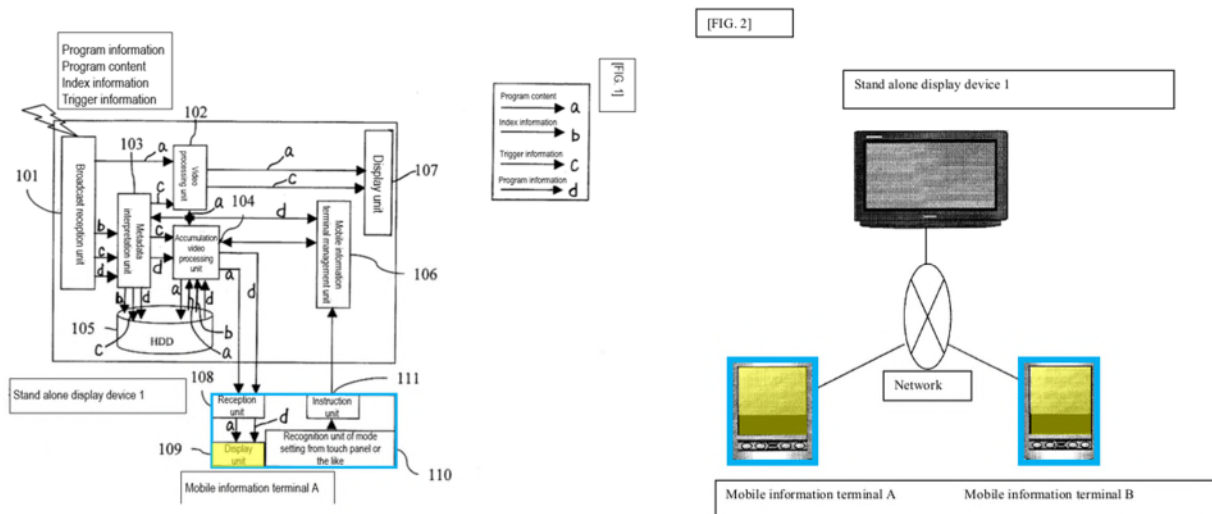
EX1004, FIGS. 7, 9. The trigger information includes the content identifier (e.g., program ID 11) that identifies the content (e.g., baseball game). The trigger

information also includes mode information 16 that indicates the modes supported by the content identified by the program ID 11. The management information 19 includes mode information 25 that indicates the modes requested by the terminal associated with terminal ID 1. Through this association, in my opinion, the trigger information 15 and the management information 19 collectively associate contents identified by the content information with one of the device specific ID information.

**11. [1j] wherein the plurality of subsidiary terminals comprise:
a second display displaying the content;**

84. In my opinion, Shindo discloses *wherein the plurality of subsidiary terminals (mobile information terminals A-B) comprise...a second display (display unit 109) displaying the content.* EX1004, FIGS. 1-2, ¶42, ¶49, ¶53.

85. Shindo's mobile information terminals (blue), such as mobile information terminal A, includes a display unit (yellow):



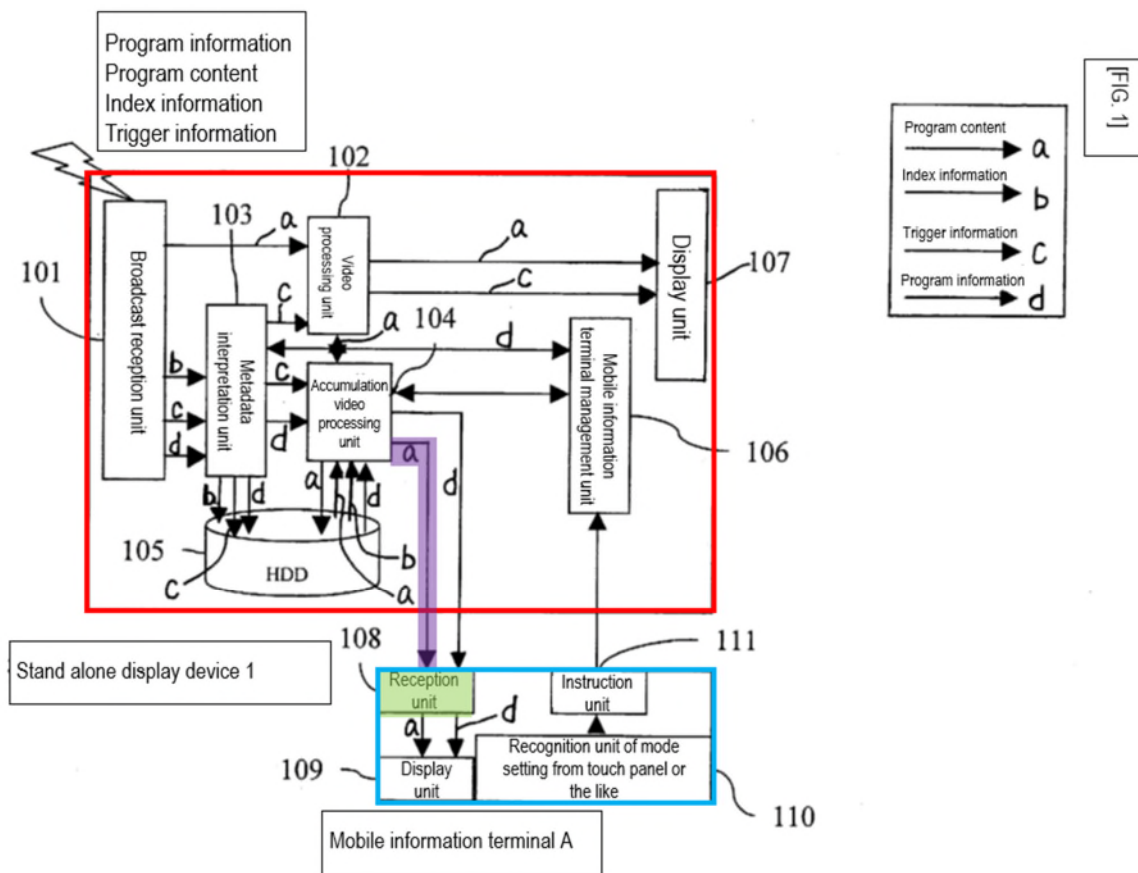
EX1004, FIG. 1 (display unit 109), FIG. 2 (illustrating a display), ¶42 (“mobile information terminal A is composed of a reception unit that receives the input of the reconstructed program content from the accumulated video processing unit 104 of the stationary display device 1 and sends it to the display unit 109, the display unit 109...receives the reconstructed program content from the reception unit 108 and displays it”), ¶49 (“Mobile information terminal A receives the sent stream at the reception unit 10-8 and displays it on the display unit 109”), ¶53 (“display unit 109...may display the arrival of trigger information and its content on the screen”).

12. [1k] [wherein the plurality of subsidiary terminals comprise...] a second controller controlling transmission/reception with the main terminal, the second controller storing device specific ID information for identifying the subsidiary terminal and transmitting the device specific ID information to the main terminal when connecting to the main terminal, and

86. In my opinion, Shindo discloses this limitation. EX1004, ¶20. ¶40, ¶42, FIGS. 1, 9.

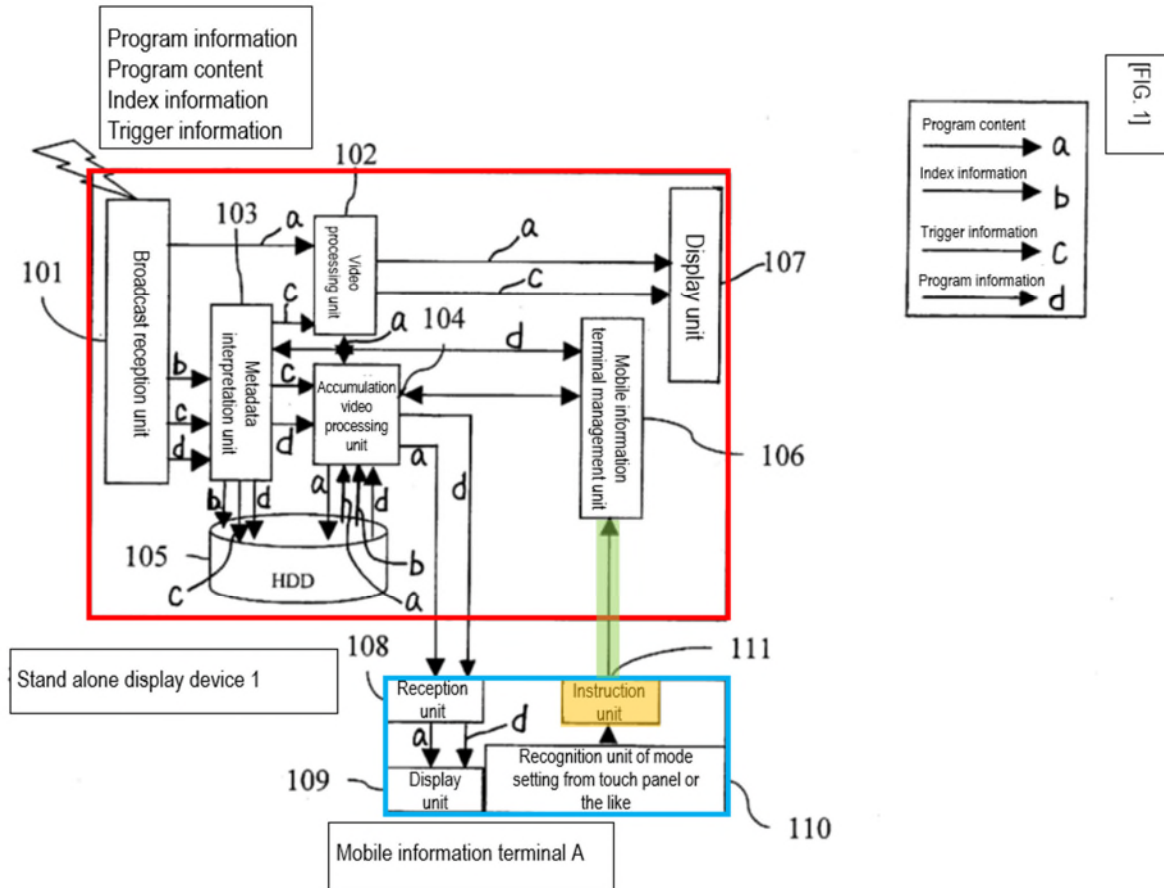
87. In my opinion, Shindo discloses wherein the plurality of subsidiary terminals (mobile information terminals A, B) comprise...a second controller (collectively, reception unit 108, instruction unit 111) controlling transmission/reception with the main terminal (display device 1). EX1004, ¶20, ¶42, ¶45, FIG. 1. Shindo’s mobile information unit includes a reception unit 108 and an instruction unit 111. EX1004, ¶42, FIG. 1. Reception unit 108 controls the

reception of information from display device 1. EX1004, ¶42 (“reception unit 108...receives the input of the reconstructed program content”). Shindo’s FIG. 1 (annotated below) includes signal lines that represent the reception of program content by mobile information terminal unit A from display device 1:



EX1004, FIG. 1. As shown, reception unit 108 (green) of mobile information terminal A (blue) receives content from display device 1 (red) as illustrated via signal line a (purple). EX1004, ¶20 (“In FIG. 1, among the alphabetic symbols...a (7 places) indicates the signal line through which program content is transmitted”).

88. Shindo's instruction unit 111 controls the transmission of information (e.g., terminal information, mode information) from the mobile information terminal to the display device. EX1004, ¶42 ("instruction unit 111...sends input information, connection information, and terminal information (FIG. 9) from the recognition unit 110 to the mobile information terminal management unit 106"), ¶45 ("a connection request from the instruction unit 111 of mobile information terminal A is sent to the mobile information terminal management unit 106 of the stand alone type display device 1, a connection is established, and terminal information is sent"), ¶45 ("the mode information is sent...from the instruction unit 111, which is accumulated in the mobile information terminal management unit 106"). Shindo's FIG. 1 (annotated below) includes signal lines that represent the transmission of information from mobile information terminal unit A to display device 1:



EX1004, FIG. 1. As shown, instruction unit 111 (orange) of mobile information terminal A (blue) transmits information from mobile information terminal A (blue) to display device 1 (red) as illustrated via signal line (green). EX1004, ¶20 (“In FIG. 1, among the alphabetic symbols...a (7 places) indicates the signal line through which program content is transmitted”).

89. In my opinion, Shindo discloses *the second controller* (reception unit 108, instruction unit 111) *storing device specific ID information* (terminal ID) *for identifying the subsidiary terminal* (mobile information terminal A or B). EX1004, ¶40, ¶42, ¶45, FIG. 9. Shindo’s instruction unit 111 sends terminal information to

display device 1 when a connection request is made. EX1004, ¶40 (“mobile information terminal management unit 106 accepts a connection request from the mobile information terminal A, establishes a connection, and further accumulates and manages information (management information) of the mobile information terminal A”), ¶45 (“a connection request from the instruction unit 111...is sent to the mobile information terminal management unit 106...a connection is established, and terminal information is sent”). The terminal information is shown in FIG. 9 and includes, among other items, the terminal ID that identifies a specific terminal:

[FIG. 9]

19	
20	Terminal ID 1
21	Owner Taro Matsushita
22	Connection Status ON
23	User Taro Matsushita
24	Performance DisplaySize=2.5 Resolution=345 x 456 encode=mpeg4.wmv.asx
25	Mode Information Replay

EX1004, FIG. 9, ¶40 (“terminal ID 20 of the mobile information terminal”). Shindo’s recognition unit stores the terminal information 19 so that it can send terminal information 19 to management unit 106. EX1004, ¶42 (“instruction unit 111...sends...terminal information (FIG. 9) from the recognition unit 110 to the mobile information terminal management unit 106”).

90. In my opinion, Shindo discloses *second controller* (reception unit 108, instruction unit 111)...*transmitting the device specific ID* (terminal ID) *information to the main terminal* (display device 1) *when connecting to the main terminal* (display device 1). EX1004, ¶40, ¶45. Shindo's instruction unit 111 sends terminal information, which includes the terminal ID, to display device 1 when a connection request is made. EX1004, ¶40 ("mobile information terminal management unit 106 accepts a connection request from the mobile information terminal A, establishes a connection, and further accumulates and manages information (management information) of the mobile information terminal A"), ¶45 ("a connection request from the instruction unit 111...is sent to the mobile information terminal management unit 106...a connection is established, and terminal information is sent"), FIG. 9 ("terminal ID").

13. **[11] wherein, the main terminal determines whether it is possible to connect to the subsidiary terminal storing the device specific ID information, and transmits the content¹ stored in the storage to the subsidiary terminal which can be connected, based on the association information then the**

¹ Based on my review of the claim, it is unclear what "the content" refers back to.

Accordingly, I have shown that "the content" can refer to both "the contents" described limitation 1d or "one of the contents" in limitations 1h-1i.

subsidiary terminal reproduces the received content on the second display.

91. In my opinion, Shindo discloses this limitation. EX1004, ¶22, ¶26, ¶28, ¶¶33-34, ¶38, ¶42.

92. In my opinion, Shindo discloses wherein, the main terminal (display device 1) determines whether it is possible to connect to the subsidiary terminal (mobile information terminal A) storing the device specific ID information (terminal ID). EX1004, ¶22, ¶26, ¶28, ¶33. Shindo's display device 1 receives trigger information that "specify the timing of transfer or distribution of a program to a mobile information terminal." EX1004, ¶22. In operation, Shindo's display device receives, as input, metadata, such as the trigger information, from broadcast reception unit 101. EX1004, ¶26. Shindo's display device then determines whether it is possible to connect to a mobile terminal by referencing the management information associated with the mobile terminal to determine the connection status of the mobile terminal. EX1004, ¶37 ("management unit 105 is requested to acquire the status of the mobile information terminal to which the rearranged program content is to be transmitted"), ¶40 ("management information 19 of the mobile information terminal includes...information indicating whether the connection status is ON or OFF 22"), FIG. 9. Furthermore, as previously discussed, the mobile information terminal stores its terminal ID. See §IV(B)(12) (limitation 1k).

93. Separately, in my opinion, when the input is trigger information, Shindo's display device also determines whether it is possible to connect to a mobile terminal for the purpose of satisfying the trigger information by matching the mode information in the trigger information to stored mode information in the management information associated with the mobile information terminal. EX1004, ¶28 ("if the input is trigger information, the metadata interpretation unit 103 first inquires of the mobile information terminal management unit 106 whether there is a mobile information terminal with the same information as the trigger information"), ¶33 ("the mode information in the trigger information 15 is detected, and the mobile information terminal management unit 106 is inquired as to whether a mobile information terminal with the corresponding mode set exists").

94. In my opinion, Shindo discloses the main terminal (display device 1)...transmits the content (one or more scenes of a program) stored in the storage (HDD) to the subsidiary terminal (mobile device terminal A) which can be connected, based on the association information (trigger information, management information) EX1004, ¶28, ¶¶33-34, ¶38, ¶42. Shindo's display device 1 transmits the content that has been accumulated to the mobile information terminal in accordance with the mode information included in both the trigger information and the management information and the one or more segments or scenes of content specified in the index information. EX1004, ¶28 ("If there is a mobile information

terminal, the metadata interpretation unit 103 searches the HDD 105 for index information 10 of the corresponding index ID 12, extracts the partial program content associated with the corresponding index information 10, and sends it to the accumulated video processing unit 104 together with the mobile information terminal information”), ¶33 (“the mode information in the trigger information is detected, and the mobile information terminal management unit 106 is inquired as to whether a mobile information terminal with the corresponding mod set exists...[i]f the corresponding mobile information terminal exists based on the detected index information 10, program content is extracted from HDD 105...the program content...[is] sent directly from HDD 105 to accumulated video processing unit 104”), ¶34 (“accumulated video processing unit 104 rearranges the partial content based on the contents of trigger information 15...and sends the reconstructed program content to the mobile information terminal”), ¶42 (“mobile information terminal A is composed of a reception unit 108 that receives the input of the reconstructed program content from the accumulated video processing unit 104 of the stationary display device 1”). The program content is extracted from HDD 105. EX1004, ¶34 (“When the accumulated video processing unit 104 receives program content input from video processing unit 102, it accumulates the program content in HDD 105 for each program”), ¶38.

95. In my opinion, Shindo discloses *and then the subsidiary terminal* (mobile information terminal) *reproduces the received content* (one or more scenes of program content) *on the second display* (display). EX1004, 42. Shindo's mobile information terminal "receives the input of the reconstructed program content from the accumulated video processing unit 104 of the stationary display device 1 and sends it to the display unit 109...that receives the reconstructed program content from the reception unit 108 and displays it." EX1004, ¶42.

C. Claim 2 - The contents reproducing system according to claim 1, wherein the main terminal includes a converter down-converting the content and transmits the down-converted content to the subsidiary terminal.

96. In my opinion, Shindo renders this claim obvious.

97. As I explain above, Shindo discloses *the contents reproducing system of claim 1*. See §IV(B) (claim 1).

98. In my opinion, Shindo discloses *wherein the main terminal* (display device 1) *includes a converter* (conversion function of accumulated video processing unit 104) *down-converting the content* (program content *and transmits the down converted content to the subsidiary terminal* (mobile information terminal A)). Shindo discloses receiving management information for each of the mobile information terminals. EX1004, ¶40. The management information includes "various information such as...the performance (or function 24) of the mobile information terminal" as shown in FIG. 9:

[FIG. 9]

		19
20	Terminal ID	1
21	Owner	Taro Matsushita
22	Connection Status	ON
23	User	Taro Matsushita
24	Performance	DisplaySize=2.5 Resolution=345 x 456 encode=mpeg4.wmv.asx
25	Mode Information	Replay

EX1004, ¶40, FIG. 9. As shown, FIG. 9 includes performance information 24 (green) that indicates the mobile terminal's display size, resolution, and encoding information. Shindo's accumulated video processing unit 104 "inquires...about the information of the information terminal A, and processes the stream according to the mobile information terminal." EX1004, ¶49 ("in the case of the mobile terminal management information shown in FIG. 9, the stream is processed according to display size=2.5, resolution=345x456, and encode=mpeg4"). In other words, Shindo discloses converting the program content into a format compatible with the performance specifications of the mobile terminal before sending the program content to the mobile terminal EX1004, ¶37 ("the program content is reconstructed to suit the mobile information terminal (S407). Specifically, it is assumed that the format is converted and the file size is changed, that is, the bit rate is changed"). In my opinion, a POSITA would have understood and found obvious that this converting can include a down converting of the content, such as

when the mobile terminal has a smaller or lower-resolution display than the main terminal. Following the conversion, “accumulated video processing unit 104 sends the stream to the mobile information terminal A according to the terminal information.” EX1004, ¶49.

D. Claim 3 - The contents reproducing system according to claim 1, wherein the main terminal includes a network interface and acquires the content from an external server via the network interface.

99. In my opinion, Shindo renders this claim obvious.

100. As I explain above, Shindo discloses *the contents reproducing system of claim 1*. See §IV(B) (claim 1).

101. In my opinion, Shindo discloses *wherein the main terminal (display device 1) includes a network interface (broadcast reception unit 101) and acquires the content (program content) from an external server via the network interface*.

Shindo discloses that display device 1 includes “a broadcast reception unit 101 that receives...program content...from broadcast waves or a network.” EX1004, ¶20, ¶8. The network refers to “networks such as ADSL and FTTH, but are not limited to those.” EX1004, ¶23. In my opinion, a POSITA would have understood and found obvious that ADSL corresponds to “asymmetric digital subscribe line” and FTTH corresponds to “fiber to the home.” EX1008, 3:4-5, 34-36. As is generally known in the art, ADSL is a “network delivery system...[that] has the downstream

capacity to handle the most complex data transfers, such as full motion video.”

EX1008, 3:4-5.

102. In my opinion, because Shindo discloses that display device 1 can receive program content over a network via broadcast reception unit 101, a POSITA would have understood and found obvious that display device 1 or broadcast reception unit 101 would include a network interface to communicate with an external system over a network. Furthermore, in my opinion, a POSITA would have understood and found obvious that display device 1 or broadcast reception unit 101 would communicate with an external server using the network interface, such as when receiving program content in the form of full motion video using ADSL.

E. Claim 4

103. In my opinion, Shindo renders this claim obvious.

1. [4pre] A contents reproducing system comprising:

104. In my opinion, Shindo discloses this limitation. §IV(B)(1) (limitation 1pre).

2. [4a] a main terminal;

105. In my opinion, Shindo discloses this limitation. §IV(B)(2) (limitation 1a).

3. [4b] first subsidiary terminal; and

106. In my opinion, Shindo discloses this limitation. This limitation has been recast from “a plurality of subsidiary terminals” to “first subsidiary terminal.” Nevertheless, Shindo discloses a first subsidiary terminal, such as mobile information terminal A. §IV(B)(3) (limitation 1b).

4. [4c] second subsidiary terminal,

107. In my opinion, Shindo discloses this limitation. This limitation has been recast from “a plurality of subsidiary terminals” to “second subsidiary terminal.” Nevertheless, Shindo discloses a second subsidiary terminal, such as mobile information terminal B. §IV(B)(3) (limitation 1b).

5. [4d] wherein the main terminal comprises: a storage storing the contents;

108. In my opinion, Shindo discloses this limitation. §IV(B)(4) (limitation 1c).

6. [4e] [wherein the main terminal comprises...] a first display displaying the contents; and

109. In my opinion, Shindo discloses this limitation. §IV(B)(5) (limitation 1d).

7. [4f] [wherein the main terminal comprises...] a first controller controlling transmission/reception with the first subsidiary terminal and the second subsidiary terminal,

110. In my opinion, Shindo discloses this limitation. This limitation has been recast from reciting “with the subsidiary terminals” to “with the first

subsidiary terminal and the second subsidiary terminal.” Nevertheless, in my opinion, Shindo discloses this limitation with respect to the first subsidiary terminal and the second subsidiary terminal. §IV(B)(6) (limitation 1e).

8. **[4g] wherein the first controller is configured to: store first device specific identification (ID) information of the first subsidiary terminal and second device specific ID information of the second subsidiary terminal,**

111. In my opinion, Shindo discloses this limitation. This limitation has been recast from reciting “a plurality of device specific identification (ID) information of the subsidiary terminals” to “with the first subsidiary terminal and the second subsidiary terminal.” Nevertheless, in my opinion, Shindo discloses this limitation with respect to the first subsidiary terminal (e.g., mobile information terminal A). §IV(B)(7) (limitation 1f).

9. **[4h] [wherein the first controller is configured to...] store first content information for identifying first content among the contents and second content information for identifying second content among the contents, and**

112. In my opinion, Shindo discloses this limitation. This limitation has been recast from reciting “a plurality of content information” to “first content information for identifying first content among the contents and second content information for identifying second content among the contents.” Nevertheless, in my opinion, Shindo discloses this limitation. §IV(B)(8) (limitation 1g).

10. **[4i] [wherein the first controller is configured to...] store association information for transmitting one of the first**

content or the second content to one of the first subsidiary terminal or the second subsidiary terminal,

113. In my opinion, Shindo discloses this limitation. This limitation has been recast from reciting “store association information for transmitting one of the contents to one of the subsidiary terminals” to “store association information for transmitting one of the first content or the second content to one of the first subsidiary terminal or the second subsidiary terminal.” Nevertheless, in my opinion, Shindo discloses this limitation as “one of the first content or the second content” is the same as “one of the contents” and “one of the first subsidiary terminal or the second subsidiary terminal” is the same as “to one of the subsidiary terminals.” §IV(B)(9) (limitation 1h).

11. [4j] wherein the association information defines that one of the first content or the second content is associated with one of the first device specific ID information or the second device specific ID information,

114. In my opinion, Shindo discloses this limitation. This limitation has been recast from reciting “the association information defines that one of the contents identified by the content information is associated with one of the device specific ID information” to “the association information defines that one of the first content or the second content is associated with one of the first device specific ID information or the second device specific ID information.” Nevertheless, in my opinion, Shindo discloses this limitation as “one of the first content or the second

content” is the same as “one of the contents” and “one of the first device specific ID information or the second device specific ID information” is the same as “one of the subsidiary terminals.” §IV(B)(10) (limitation 1i).

12. [4k] wherein the first subsidiary terminal comprises: a second display displaying the content; and

115. In my opinion, Shindo discloses this limitation. §IV(B)(11) (limitation 1j).

13. [4l] [wherein the first subsidiary terminal comprises...] a second controller controlling transmission/reception with the main terminal, the second controller storing the first device specific ID information for identifying the first subsidiary terminal and transmitting the first device specific ID information to the main terminal when connecting to the main terminal,

116. In my opinion, Shindo discloses this limitation. §IV(B)(12) (limitation 1k).

14. [4m] wherein the second subsidiary terminal comprises: a third display displaying the content; and

117. In my opinion, Shindo discloses this limitation. §IV(B)(11) (limitation 1j).

15. [4n] [wherein the second subsidiary terminal comprises...]a third controller controlling transmission/reception with the main terminal, the third controller storing the second device specific ID information for identifying the second subsidiary terminal and transmitting the second device specific ID

**information to the main terminal when connecting to the
main terminal, and wherein,**

118. In my opinion, Shindo discloses this limitation. §IV(B)(12) (limitation 1k).

- 16. [4o] when the association information defines that the first content is associated with the first device specific ID information and the second content is associated with the second device specific ID information, the main terminal transmits the first content to the first subsidiary terminal and transmits the second content to the second subsidiary terminal, and**

119. In my opinion, Shindo discloses this limitation. §IV(B)(13) (limitation 1l); *see also* EX1004, ¶43 (showing multiple terminals watching the same broadcast), ¶¶50-52 (showing terminal B joining in the middle of the program, requesting highlight mode first, followed by a request for replay mode).

- 17. [4p] when the association information defines that the second content is associated with the first device specific ID information and the first content is associated with the second device specific ID information, the main terminal transmits the second content to the first subsidiary terminal and transmits the first content to the second subsidiary terminal.**

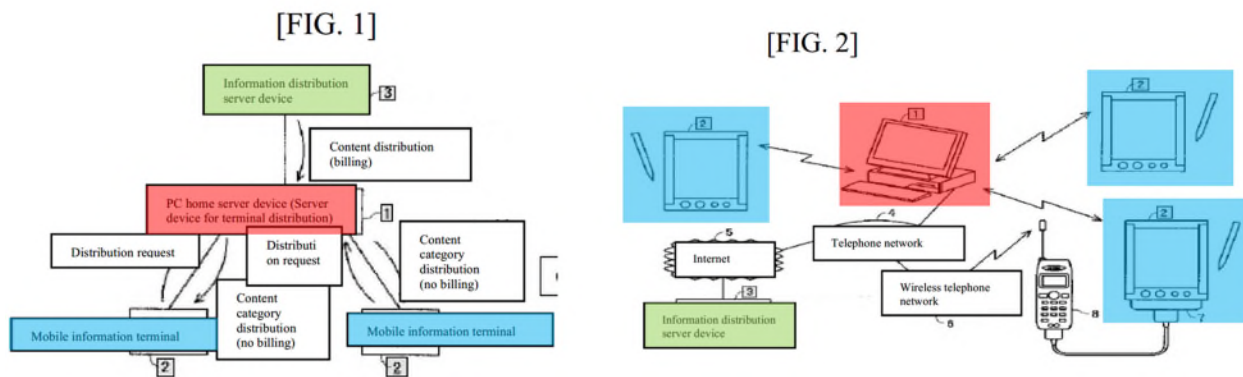
120. In my opinion, Shindo discloses this limitation. §IV(B)(13) (limitation 1l); *see also* EX1004, ¶43 (showing multiple terminals watching the same broadcast), ¶¶50-52 (showing terminal B joining in the middle of the program, requesting highlight mode first, followed by a request for replay mode).

V. GROUND 2: CLAIMS 1-4 ARE OBVIOUS IN VIEW OF SASAKI

A. Overview of Sasaki

121. Japanese Patent Appl. Pub. No. 2003-208375 (“Sasaki”) was filed January 10, 2002, and published July 25, 2003. EX1006, cover page. Sasaki is prior art under 35 U.S.C. §§102(a) and (b) (pre-AIA).

122. Sasaki generally relates to an “information distribution system” that includes a “PC home server device 1, which is made up of a personal computer 1”, “a PDA 2,” and an “information distribution server device [which] is a Web server device 3” (green):



EX1006, FIGS. 1-2, ¶¶40-41. Server device 1 receives content from Web server device 3 and distributes the content to PDAs 2. EX1006, ¶46 (“information distribution server device 3 and the PC home server device 1 are connected via the Internet 5 and the public telephone network 4”), ¶48 (“information distribution server device 3 distributes content information periodically or upon request from the PC home server device 1”), ¶77 (“Under the control of the CPU 101, the

previous break information control memory unit 112 stores and manages, for each terminal identification of each PDA 2, the delimiter information for the transmission information segment last distributed for each content previously distributed to the PDA 2 as the previous delimiter information”), ¶78 (“In response to a distribution request for content previously requested for distribution, the CPU 101 generates the current transmission information segment by referring to the previous delimiter information in the previous break information control memory unit 112”), ¶131 (“the distribution content database 107 is searched for the content specified by the content identification information received in step S308, and the content segment for the current transmission is calculated from the searched content based on the free memory capacity of the content area received in step S308 and the previous delimiter information, and the data of the calculated content segment is stored in the distribution data storage unit 111”).

123. In my opinion, Sasaki is analogous art to the '650 patent because (1) Sasaki is from the same field of endeavor as the '650 patent and (2) they are both patents in the area of content delivery systems. In addition, Sasaki is reasonably relevant to the problem the patent is concerned with, as shown in my analysis below.

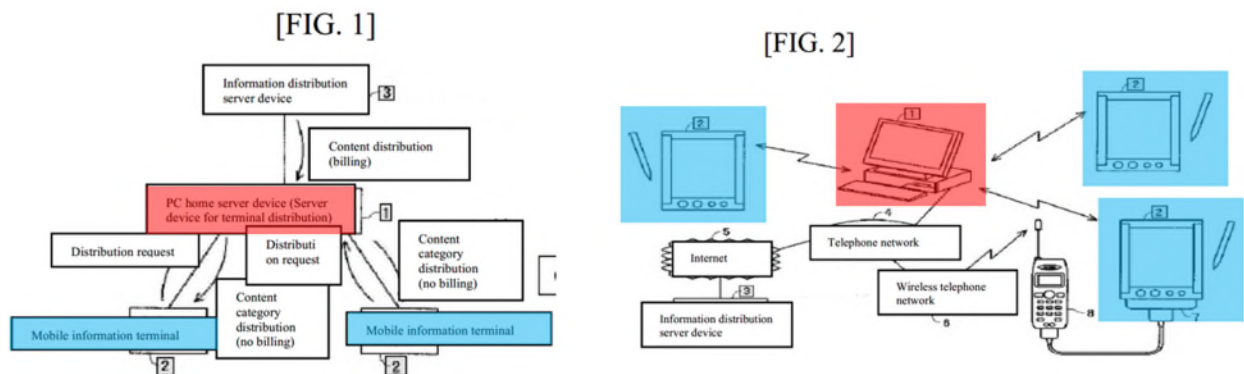
124. Based on my review of the '650 patent's prosecution history (EX1003), Sasaki does not appear to be considered during prosecution of the '650 patent.

B. Claim 1

125. In my opinion, Sasaki renders this claim obvious.

1. [1pre] A contents reproducing system comprising:

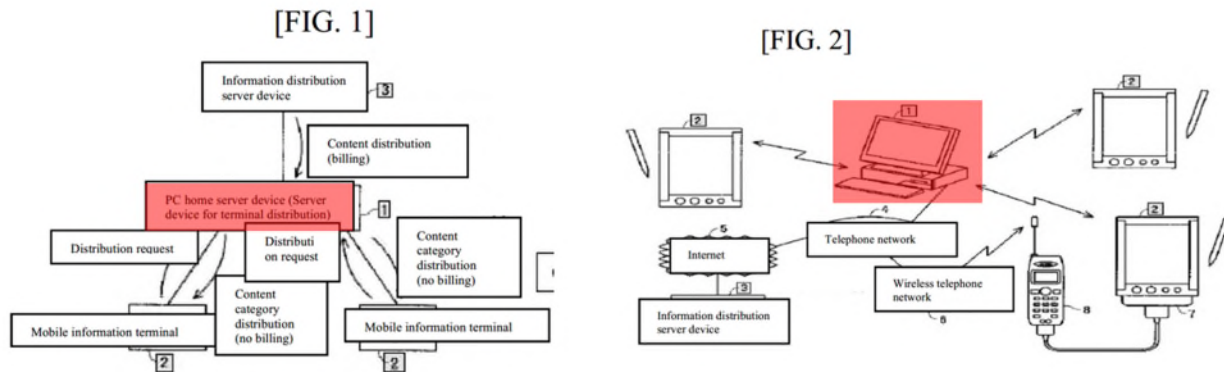
126. In my opinion, Sasaki discloses *a contents reproducing system* (collectively, PC home server device 1 (red), one or more personal digital assistants (PDAs) 2 (blue)):



EX1006, FIGS. 1-2, ¶40 (“FIG. 2 is a diagram showing the overall outline of the first embodiment of the information distribution system” which includes “PC home server 1, which is made up of a personal computer 1” and “PDA 2, which may be equipped by each family member”).

2. [1a] a main terminal; and

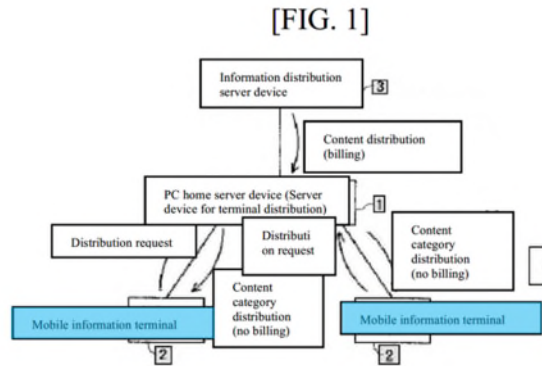
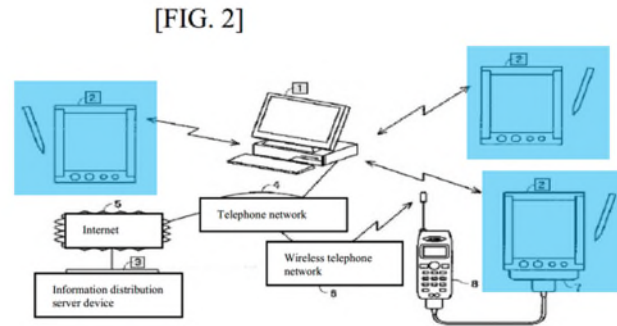
127. In my opinion, Sasaki discloses *a main terminal* (PC home server device 1, red). EX1006, ¶40 (“FIG. 2 is a diagram showing the overall outline of the first embodiment of the information distribution system” which includes “PC home server 1, which is made up of a personal computer 1”):



EX1006, FIGS. 1-2 (PC home server device 1/main terminal 1).

3. [1b] a plurality of subsidiary terminals,

128. In my opinion, Sasaki discloses *a plurality of subsidiary terminals* (multiple PDAs 2, blue). EX1006, ¶40 (“FIG. 2 is a diagram showing the overall outline of the first embodiment of the information distribution system” which includes “PDA 2, which may be equipped by each family member”):



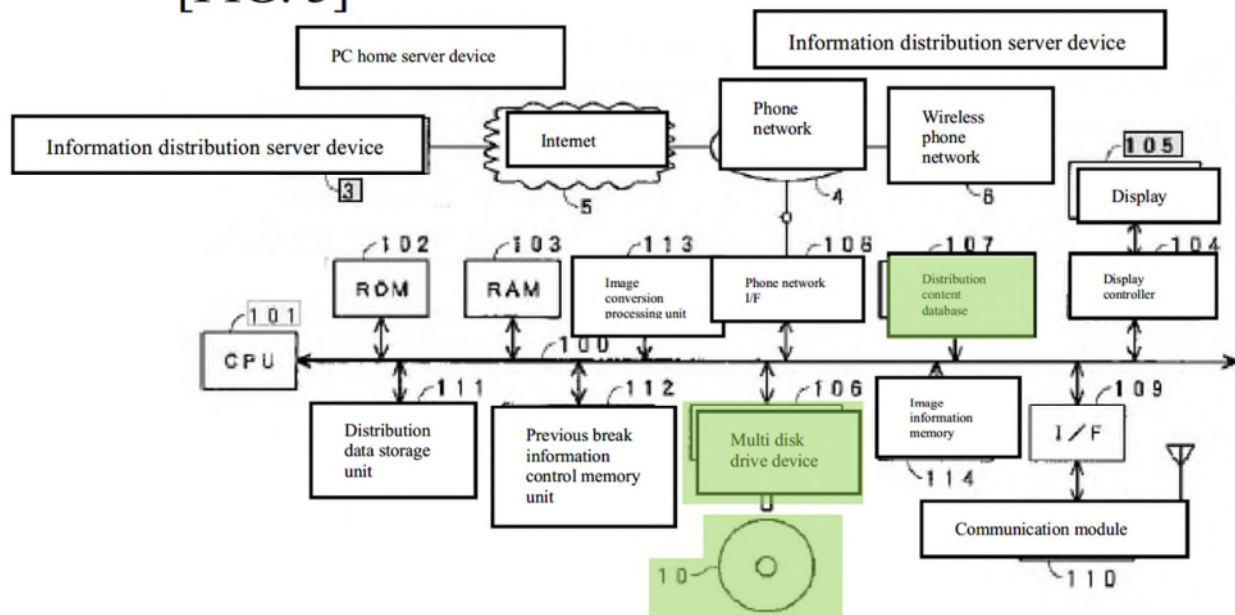
EX1006, FIGS. 1-2 (PDA 2/mobile information terminal 2/subsidiary terminals 2).

4. [1c] wherein the main terminal comprises: a storage storing the contents;

129. In my opinion, Sasaki discloses *wherein the main terminal* (server device 1) *comprises...a storage* (distribution content database 107, multi-disk drive device 106, and/or disks 10) *storing the contents*. EX1006, ¶¶50-21, ¶¶64-66, ¶¶99-100, FIG. 3.

130. Sasaki's server device "is a so-called PC home server device 1, which is made up of a personal computer 1." EX1006, ¶50. Sasaki's server device includes a storage (green):

[FIG. 3]



EX1006, FIG. 3, ¶51 (“server device 1 is equipped with a distribution information database”), ¶64 (“FIG. 3 shows an example of the configuration of PC home server device1[sic]” which includes “a multi-disk drive device 106 for driving disks 10 such as CD-ROMs...[and] a distribution content database 107.” The distribution content database 107 stores contents. EX1006, ¶65 (“distribution content database 107 for storing information on the content to be distributed”), ¶66 (“distribution content database 107 stores content information downloaded by the PC home server device 1 from the information distribution server 3...and content information read from the disc 10 via the multi-disc drive device 106”), ¶99 (“electronic newspapers are imported into the PC home server device 1...and stored in the distribution content database 107”), ¶100 (“Information on electronic

novels and CD comics is imported from the disk through the multi-disk drive

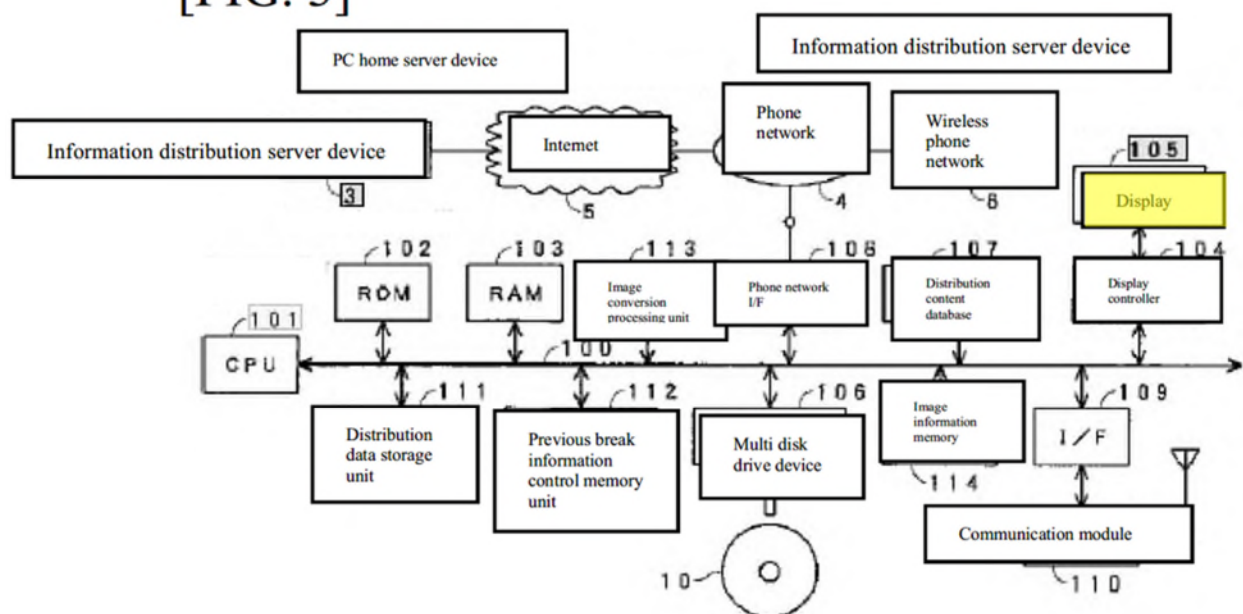
device 106 and stored in the distribution content database 107”).

5. [1d] [wherein the main terminal comprises...] a first display displaying the contents; and

131. In my opinion, Sasaki discloses *wherein the main terminal (server device 1) comprises...a first display (display 105) displaying the contents (electronic newspapers)*. EX1006, ¶65, FIG. 3.

132. Sasaki’s server device 1 includes a display (yellow):

[FIG. 3]



EX1006, FIG. 3, ¶65 (“FIG. 3 shows an example of the configuration of PC home sever device1[sic]” which includes “a display controller 104 that connects a display 105”). In my opinion, a POSITA would have understood and found obvious that display device 1 is capable of displaying contents because server

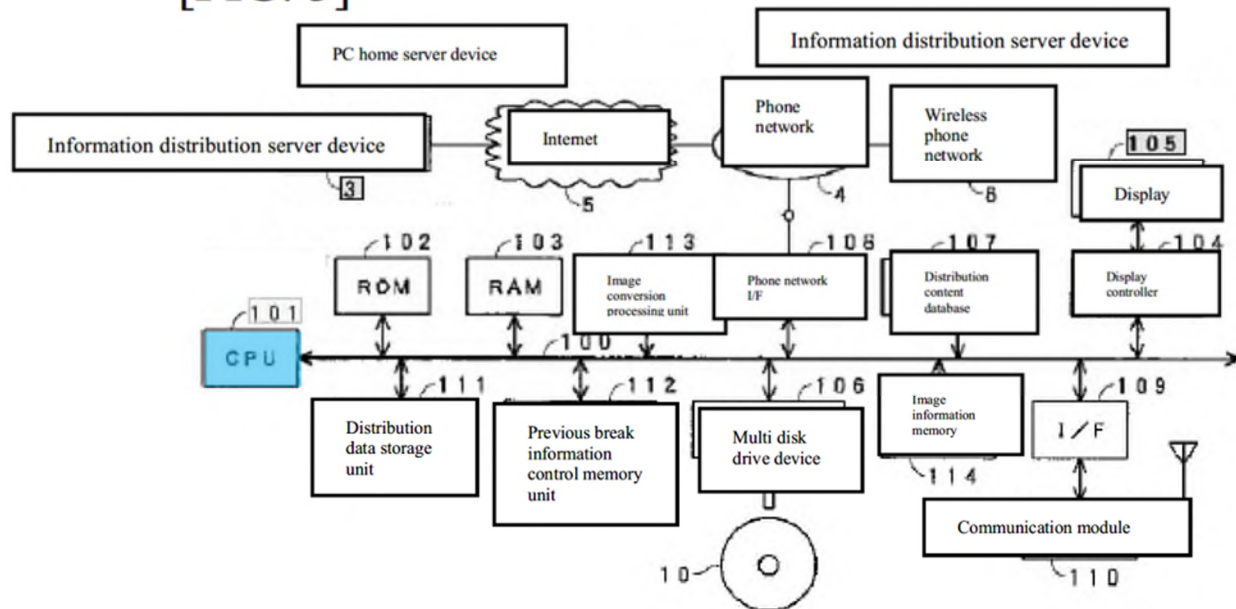
device 1 is described as a personal computer that has a display 105 and a display controller 104, and server device 1 stores the contents in its distribution content database. §V(B)(4) (limitation 1c). In my opinion, a POSITA would have therefore found it at least obvious or at most inherent that Sasaki's server device 1 can display the electronic newspaper it has stored on its own display so the user of server device 1 could view it.

6. [1e] [wherein the main terminal comprises...] a first controller controlling transmission/reception with the subsidiary terminals,

133. In my opinion, Sasaki discloses *wherein the main terminal* (server device 1) *comprises...a first controller* (CPU 101) *controlling transmission/reception with the subsidiary terminals* (PDAs 2). EX1006, ¶55, ¶¶64-65, ¶68, ¶70, ¶124, ¶¶126-127, ¶138, FIG. 3.

134. Sasaki's server device 1 includes a CPU 101 (blue) that performs various distribution processing procedures:

[FIG. 3]



EX1006, FIG. 3 (CPU 101), ¶65 (“FIG. 3 shows an example of the configuration of PC home sever device1[sic]” which includes “CPU (Central Processing Unit) 101”), ¶70 (“ROM 102 stores a program that allows the CPU 101 to execute a series of information distribution processing procedures described later”).

135. CPU 101 controls the transmissions to PDAs 2. EX1006, ¶70 (“ROM 102 stores a program that allows the CPU 101 to execute a series of information distribution processing procedures described later”), ¶124 (“The processing of each step of this flowchart is mainly performed by the CPU 101 of PC home server device 1”), ¶138 (“When it is determined in step S322 that a distribution start request has been received, the CPU 101 reads the content segment data from the distribution data memory 111 and transmits it to the PDA2 via the communication

module”), ¶55 (“home server device 1 extracts the free memory capacity of the memory area of the PDA 2 that receives the distribution information from the distribution request, generates a transmission information segment, which is distribution information of a capacity that matches the free capacity, from the information of the content specified by the content identification information, and transmits the generated transmission information segment to the PDA 2”), ¶64.

136. CPU 101 controls the receptions from PDAs 2. EX1006, ¶70 (“ROM 102 stores a program that allows the CPU 101 to execute a series of information distribution processing procedures described later”), ¶68 (“server device 1 receives a distribution request from the PDA 2 connected by wireless LAN through the communication module 110”), ¶124 (“The processing of each step of this flowchart is mainly performed by the CPU 101 of PC home server device 1”), ¶126 (“Then it is determined whether or not a request for a distribution service has been received from the PDA 2 (step S305), and if the request is for a service other than the distribution service, the step proceeds to a routine for executing the requested other service (step S306)”), ¶127 (“When it is determined in step S305 that a request for a distribution service has been received from the PDA2”).

7. **[1f] wherein the first controller is configured to: store a plurality of device specific identification (ID) information of the subsidiary terminals,**

137. In my opinion, Sasaki discloses *wherein the first controller (CPU 101) is configured to...store a plurality of device specific identification (ID) information (device-specific terminal identification information) of the subsidiary terminals (PDAs 2). EX1006, ¶¶52-53, ¶77, ¶128, ¶139, ¶142.*

138. Sasaki's CPU 101 stores device-specific terminal identification information that identifies PDAs 2. EX1006, ¶¶52-53 ("PDA2[sic] transmits to the PC home server device1[sic]...distribution request source identification information" which can take the form of "device-specific terminal identification information such as the serial number of the PDA2[sic]"), ¶77 ("Under the control of the CPU 101...memory unit 112 stores and manages, for each terminal identification information of each PDA 2, the delimiter information for the transmission information segment last distributed for each content previously distributed to the PDA 2 as the previous delimiter information"), ¶128 ("CPU 101 of the PC home server device 1 searches the contents stored in the previous break information control memory unit 112...using the received content identification information and distribution request source identification information, in the present example, the terminal identification information of the PDA 2"), ¶139 ("the last part of the content segment...is stored as the previous delimiter information in

the previous delimiter information control memory 112 in correspondence with the terminal identification information and content identification information of the PDA 2”), ¶142 (“PC home server device 1 stores and manages the delimiter information in association with the content identification information and the distribution requester identification information such as the terminal identification information of the PDA 2”).

8. [1g] [wherein the first controller is configured to...] store a plurality of content information for identifying each of the contents, and

139. In my opinion, Sasaki discloses *wherein the first controller (CPU 101) is configured to...store a plurality of content information for identifying each of the contents* (content identification information). EX1006, ¶¶99-100, ¶¶128-130, ¶139, ¶142.

140. Sasaki’s CPU 101 stores content identification information. EX1006, ¶142 (“server device 1 stores and manages the delimiter information in association with the content identification information and the distribution requester identification information such as the terminal identification information of the PDA 2”), ¶139 (“the last part of the content segment to be sent..., is stored as the previous delimiter information in the previous delimiter information control memory 112 in correspondence with the terminal identification information and content identification information of the PDA 2”), ¶128 (“the user selects the

content requested for distribution on the PDA2, and transmits the identification information (content ID) of the selected content, the terminal identification information (terminal ID) of the PDA2, the free memory capacity of the content area, and the display information of the PDA2, so that the PC home server device1 receives this information”), ¶129 (“CPU 101 of the PC home server device 1 searches the contents...for...the same content identification information using the received content identification information”), ¶130 (“in step S310, if the previous delimiter information for the same distribution requester identification information and the same content identification information is found, the step proceeds to step S312” in which “the distribution content database 107 is searched for the content specified by the content identification information received in step S308”), ¶100 (“Information on electronic novels and CD comics is imported from the disk through the multi-disk drive device 106 and stored in the distribution content database 107. In electronic novels, content identification information is assigned to each novel. In the case of CD comics, content identification information is assigned to each information unit from one CD or each performance”), ¶99 (“In the electronic newspapers, different content identification information is assigned to each piece of information each day. Therefore, the content identification information changes with each passing day”).

9. [1h] [wherein the first controller is configured to...] store association information for transmitting one of the contents to one of the subsidiary terminals,

141. In my opinion, Sasaki discloses *wherein the first controller (CPU 101) is configured to...store association information (delimiter information) for transmitting one of the contents (e.g., lines of an electronic newspaper) to one of the subsidiary terminals (PDA 2).* EX1006, ¶57, ¶72, ¶78.

142. In my opinion, Sasaki's CPU 101 stores device identification information, content identification information, and delimiter information. §§V(B)(7)-(B)(8) (limitations 1f-1g); EX1006, ¶57 ("server device 1 stores in memory previous delimiter information for identifying the last part of the transmission information segment previously transmitted for each distribution request source identification information"), ¶57 ("server device 1 reads from the memory the previous delimiter information of the content specified by the content identification information"), ¶72 ("If delimiter information is assigned in advance by numbers or the like for each article, paragraph, chapter, etc., the information such as numbers can be managed as the delimiter information. However, when there is no delimiter information such as numbers, the information of the last paragraph, chapter, or the last few lines of the transmission information segment is used as the delimiter information"), ¶78 ("CPU 101 generates the current

transmission information segment by referring to the previous delimiter

information in the previous break information control memory unit 112”).

143. In my opinion, Sasaki’s CPU 101 uses delimiter information for transmitting content to a PDA. EX1006, ¶57 (“server device 1 then reads from the memory the previous delimiter information of the content specified by the content identification information included in the distribution request, generates the current transmission information segment from the delimiter position indicated by the previous delimiter information, and distributes it to the PDA 2”).

10. [1i] wherein the association information defines that one of the contents identified by the content information is associated with one of the device specific ID information,

144. In my opinion, Sasaki discloses *wherein the association information* (delimiter information) *defines that one* (e.g., a portion of content) *of the contents* (e.g., electronic newspaper or book) *identified by the content information* (content identification information) *is associated with one of the device specific ID information* (device-specific terminal identification information). §§V(B)(7)-(8) (limitations 1f-1g). EX1006, ¶¶52-23, ¶57, ¶¶129-139, FIGS. 11-12.

145. In my opinion, Sasaki’s CPU 101 uses delimiter information to identify that a portion (e.g., lines of a newspaper, chapters in a book) of the contents identified by the content identification information is associated with one of the PDAs identified by the device identification information when determining

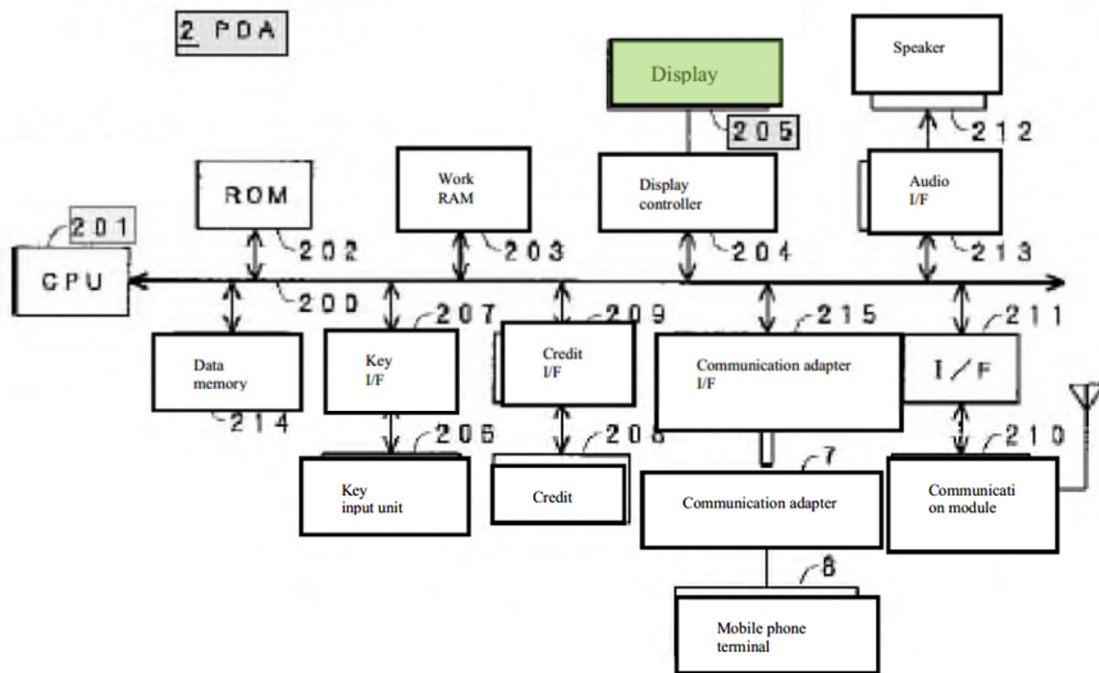
the next portion of content to send to the PDA. EX1006, ¶57 (“server device 1 then reads from the memory the **previous delimiter information** of the content specified by the **content identification information** included in the distribution request, generates the current transmission information segment from the delimiter position indicated by the previous delimiter information, and distributes it to the PDA 2”), ¶¶52-53 (“PDA2[sic] transmits to the PC home server device1[sic] a **content distribution request that comprises...**distribution request source identification information” which can take the form of “**device-specific terminal identification information** such as the serial number of the PDA2[sic]”), ¶129 (“CPU 101 of the PC home server device 1 searches the contents stored in the previous break information control memory unit 112 for previous delimiter information for the same distribution request source identification information and the same content identification information using the received content identification information and distribution request source identification information, in the present example, the terminal identification information of the PDA 2 (step S309), and determines whether the previous delimiter information was found as a result of the search (step S310)”), ¶¶130-139, FIGS. 11-12.

**11. [1j] wherein the plurality of subsidiary terminals comprise:
a second display displaying the content; and**

146. In my opinion, Sasaki discloses *wherein the plurality of subsidiary terminals (PDAs 2) comprise...a second display (display 205) displaying the content.* EX1006, ¶60, ¶79, ¶105, FIG. 4.

147. Sasaki's PDA includes a display 205 (green):

[FIG. 4]



EX1006, FIG. 4, ¶79 (“FIG. 4 shows an example of the configuration of a PDA 2” which is shown to include “a display controller 204 for connecting a display 205”), ¶60 (“the delivery request from the PDA 2 comprises information on the display of the PDA 2” and “comprises, for example, the number of vertical and horizontal pixels on the display screen, and the bit depth...[to] enable[] PC home server

device 1 to know the image size that can be displayed on one screen”), ¶105

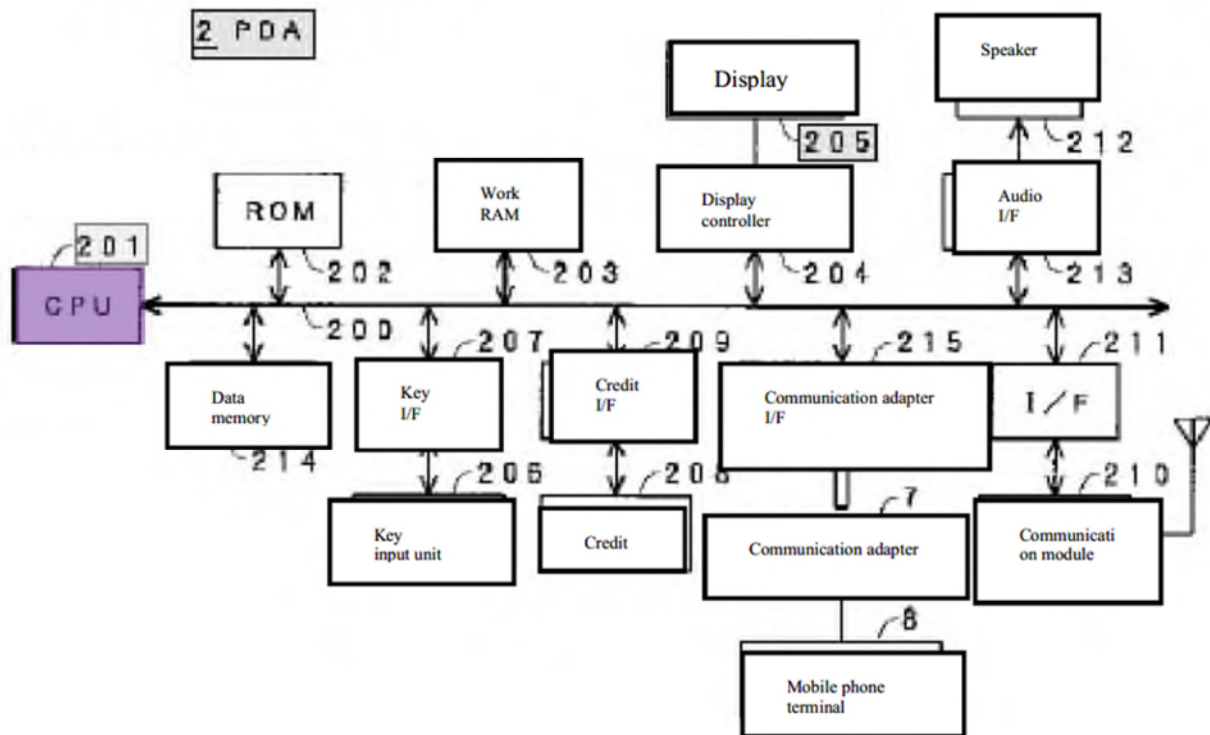
(“home server device 1 generates a transmission information segment for the current transmission...that is...converted to fit the display 214 based on the display information”).

12. [1k] **[wherein the plurality of subsidiary terminals comprise...] a second controller controlling transmission/reception with the main terminal, the second controller storing device specific ID information for identifying the subsidiary terminal and transmitting the device specific ID information to the main terminal when connecting to the main terminal, and**

148. In my opinion, Sasaki discloses this limitation. EX1006, ¶79, ¶¶93-94, ¶¶97-98, ¶104, ¶117, ¶121, ¶128, ¶149, ¶150, FIGS. 7-8.

149. In my opinion, Sasaki discloses *wherein the plurality of subsidiary terminals (PDAs) comprise...a second controller (CPU 201)*. EX1006, ¶79, FIG. 4. Sasaki’s PDA includes CPU 201 (purple):

[FIG. 4]



EX1006, FIG. 4, ¶79 (“FIG. 4 shows an example of the configuration of a PDA 2” which is shown to include “CPU 201”).

150. In my opinion, Sasaki discloses *a second controller (CPU 201) controlling transmission...with the main terminal (server device 1)*. EX1006, ¶¶93-94, ¶121, FIGS. 7-8. Sasaki’s CPU 201 controls performance of the steps illustrated in FIGS. 7-8, which include transmissions with server device 1. EX1006, ¶93 (“FIGS. 7 and 8 are flowcharts for explaining the processing of the PDA 2 when a distribution request is issued to the PC home server device 1” and “[t]he processing of this flowchart is mainly performed by the CPU 201 of the

PDA 2”), ¶94 (“When the user instructs the PDA2 to access the PC home server device1 using a touch pen or the like, the distribution request step of the PDA2 starts from the start of FIG. 7, and the CPU201 accesses the PC home server device1 using the communication module 110 (step S201”), ¶121 (“CPU 201 transmits a request to start distribution of the content segment for the selected content to the PC home server device 1 (step S230)”).

151. In my opinion, Sasaki discloses *a second controller (CPU 201) controlling...reception with the main terminal (server device 1)*. EX1006, ¶¶93, ¶¶97-98, ¶117, FIGS. 7-8. Sasaki’s CPU 201 controls performance of the steps illustrated in FIGS. 7-8, which include reception with server device 1. EX1006, ¶93 (“FIGS. 7 and 8 are flowcharts for explaining the processing of the PDA 2 when a distribution request is issued to the PC home server device 1 and the requested content information is received” and “[t]he processing of this flowchart is mainly performed by the CPU 201 of the PDA 2”), ¶97 (“When the authentication is OK in step S204, a menu screen for services such as downloading is sent from the PC home server device 1, and this menu screen is received and displayed on the display 205”), ¶98 (“a list screen of distributable contents is sent from the PC home server device 1, which the PDA 2 receives and displays on the screen of the display 205 (step S209)”), ¶117 (“When the PC home server device 1 receives a request for a content segment with a delimiter based on the delimiter

candidate requested for change, it regenerates the content segment to be sent this time as requested and transmits it to the PDA 2. The PDA 2 receives it in step S221 and displays it on the display screen 23 for delimiter confirmation information on the display 214”).

152. In my opinion, Sasaki discloses *the second controller* (CPU 201) *storing device specific ID information* (terminal ID) *for identifying the subsidiary terminal* (PDA). EX1006, ¶104, ¶128, ¶149. Sasaki’s CPU 201 stores a terminal ID that identifies the PDA of CPU 201. EX1006, ¶128 (“the user selects the content requested for distribution on the PDA2, and transmits the identification information (content ID) of the selected content, the terminal identification information (terminal ID) of the PDA2, the free memory capacity of the content area, and the display information of the PDA2, so that the PC home server device1 receives this information (step S308)”), ¶104 (“the content identification information (content ID), the terminal identification information (terminal ID), the free memory capacity of the content area of the data memory 214 at that time, and information about the display 214 are sent to the PC home server device 1 for a content distribution request”), ¶149 (“If the serial number stored in the ROM 202 of each PDA at the time of manufacture is used as this terminal identification information, the server device can recognize the display capabilities of the display

of the PDA terminal by storing this serial number and information about the display of the PDA terminal as a terminal information database”).

153. In my opinion, Sasaki discloses *the second controller* (CPU 201)...*transmitting the device specific ID information* (terminal ID) *to the main terminal* (server device 1) *when connecting to the main terminal* (server device 1). EX1006, ¶94, ¶104, ¶150. Sasaki’s CPU 201 sends the terminal ID of the PDA to server device 1 when PDA connects to server device 1. EX1006, ¶94 (“When the user instructs the PDA2 to access the PC home server device1 using a touch pen or the like, the distribution request step of the PDA2 starts from the start of FIG. 7, and the CPU201 accesses the PC home server device1 using the communication module 110 (step S201). At the time of this access, as described above, in this embodiment, the terminal identification information or user identification information stored in the ROM202 or RAM203 is read and sent as information for authentication”), ¶150 (“the terminal identification information of the PDA 2 is transmitted to the PC home server device 1 as distribution request source identification information when making a distribution request”), ¶104.

- 13. [11] wherein, the main terminal determines whether it is possible to connect to the subsidiary terminal storing the**

device specific ID information, and transmits the content² stored in the storage to the subsidiary terminal which can be connected, based on the association information then the subsidiary terminal reproduces the received content on the second display.

154. In my opinion, Sasaki discloses this limitation. EX1006, ¶44, ¶54, ¶94, ¶¶77-78, ¶131.

155. In my opinion, Sasaki discloses *wherein, the main terminal* (server device 1) *determines whether it is possible to connect to the subsidiary terminal* (PDA) *storing the device specific ID information* (terminal ID). EX1006, ¶44, ¶54, ¶94. Sasaki's server device 1 determines whether it is possible to connect to the PDA during its authentication process. EX1006, ¶44 ("After registration, when the PC home server device 1 is accessed by the PDA 2, it performs authentication based on authentication data such as registered user identification information, terminal identification information, and PIN number, and executes information distribution as described below only for PDAs 2 that have been authenticated"), ¶54 ("When the PC home server device1 receives a content distribution request from the PDA2 as a personal digital assistant, it authenticates the PDA2 as

² Based on my review of the claim, it is unclear what "the content" refers back to. Accordingly, I have shown that "the content" can refer to both "the contents" described limitation 1d or "one of the contents" in limitations 1h-1i.

described above, and then distributes the content information specified by the content identification information included in the distribution request to the requesting PDA2”), ¶94 (“When the user instructs the PDA2 to access the PC home server device1 using a touch pen or the like, the distribution request step of the PDA2 starts from the start of FIG. 7, and the CPU201 accesses the PC home server device1 using the communication module 110 (step S201). At the time of this access, as described above, in this embodiment, the terminal identification information or user identification information stored in the ROM202 or RAM203 is read and sent as information for authentication”). Furthermore, as previously discussed, the PDA stores its terminal ID. See §V(B)(12) (limitation 1k).

156. In my opinion, Sasaki discloses *the main terminal* (server device 1)...*transmits the content* (e.g., electronic newspaper) *stored in the storage* (distribution content database 107) *to the subsidiary terminal* (PDA) *which can be connected, based on the association information* (delimiter information). EX1006, ¶¶77-78, ¶131. Following connection with the PDA, Sasaki’s server device 1 uses the delimiter information to determine the next segment of content to send to the PDA. EX1006, ¶77 (“Under the control of the CPU 101, the previous break information control memory unit 112 stores and manages, for each terminal identification of each PDA 2, the delimiter information for the transmission information segment last distributed for each content previously distributed to the

PDA 2 as the previous delimiter information”), ¶78 (“In response to a distribution request for content previously requested for distribution, the CPU 101 generates the current transmission information segment by referring to the previous delimiter information in the previous break information control memory unit 112”), ¶131 (“the distribution content database 107 is searched for the content specified by the content identification information received in step S308, and the content segment for the current transmission is calculated from the searched content based on the free memory capacity of the content area received in step S308 and the previous delimiter information, and the data of the calculated content segment is stored in the distribution data storage unit 111”).

C. Claim 2 - The contents reproducing system according to claim 1, wherein the main terminal includes a converter down-converting the content and transmits the down-converted content to the subsidiary terminal.

157. In my opinion, Sasaki renders this claim obvious.

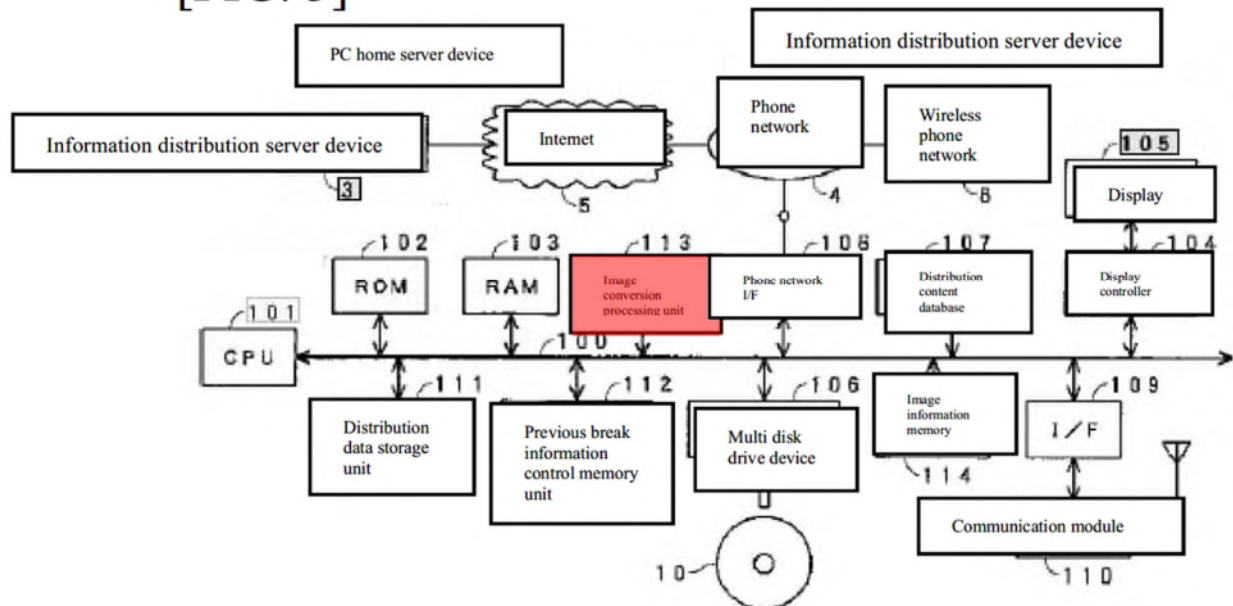
158. As I explain above, Sasaki discloses *the contents reproducing system according to claim 1*. See §V(B) (claim 1).

159. In my opinion, Sasaki discloses *wherein the main terminal* (server device 1) *includes a converter* (image conversion processing unit 113) *down-converting the content* (e.g., electronic newspaper) *and transmits the down converted content* (e.g., converted electronic newspaper) *to the subsidiary terminal*

(PDA). Sasaki's server device 1 includes "image conversion processing unit 113"

(red):

[FIG. 3]



EX1006, FIG. 3, ¶65 ("FIG. 3 shows an example of the configuration of PC home server device1[sic]" which is shown to include "image conversion processing unit 113"), ¶69 ("image conversion processing unit 113 is a processing unit that converts the transmission data to match the display capabilities, etc., based on the display information"), ¶64 ("server device 1 extracts information about the display of the PDA 2 from the distribution request, and if the distribution information is display information, it also converts the information to be distributed into information that matches the display capabilities of the PDA 2 that made the distribution request, and transmits it"), ¶¶60-62.

160. Once the content is down-converted, Sasaki's server device 1 sends the down-converted content to the PDA. EX1006, ¶61 ("By notifying PC home server device 1 of this display information, it can convert images such as digital photographs and illustrations contained in articles in an electronic newspaper into an appropriate format and distribute them"), ¶62 ("PC home server device 1 will convert the data of the transmission information segment to be distributed into an image format suitable for the display of PDA 2"), ¶105 ("the PC home server device 1 generates a transmission information segment for the current transmission...converted to fit the display 214 based on the display information"), ¶132 ("CPU 101 refers to the display information from the PDA 2 and processes the data using the image conversion processing unit 113 so that it matches the display capabilities of the display of the requesting PDA 20"), ¶144.

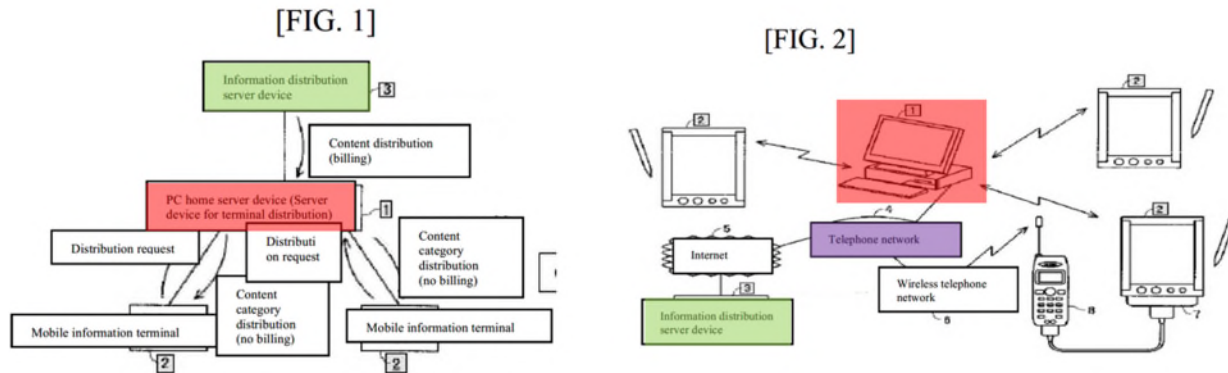
D. Claim 3 - The contents reproducing system according to claim 1, wherein the main terminal includes a network interface and acquires the content from an external server via the network interface.

161. In my opinion, Sasaki renders this claim obvious.

162. As I explain above, Sasaki discloses *the contents reproducing system according to claim 1. See §V(B) (claim 1).*

163. In my opinion, Sasaki discloses *wherein the main terminal (server device 1) includes a network interface (telephone network interface 108) and acquires content (e.g., electronic newspaper) from an external server (information*

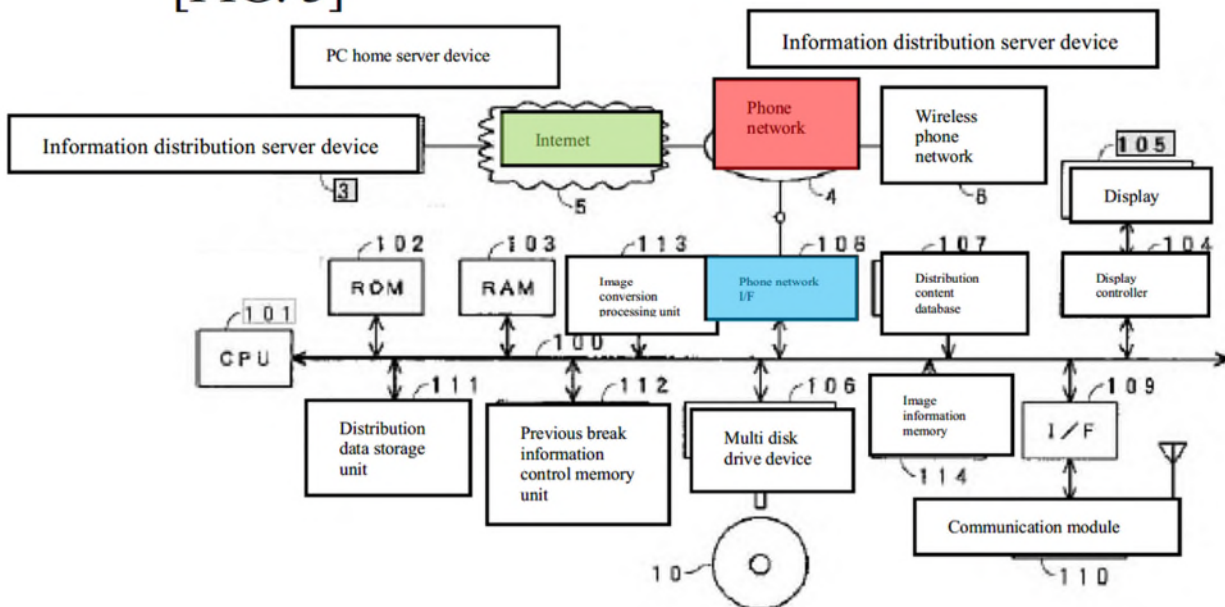
distribution server device 3) *via the network interface* (telephone network interface 108). Sasaki's server device 1 (red) communicates with information distribution server device 3 (green) via telephone network 104 (purple) to receive the contents:



EX1006, FIGS. 1-2, ¶40 (“FIG. 2 is a diagram showing the overall outline... of the information distribution system” that includes “server device 1” and “information distribution server device [which] is a Web server device 3 on the Internet”), ¶46 (“The information distribution server device 3 and the PC home server device 1 are connected via the Internet 5 and the public telephone network 4”), ¶47 (“information distribution server device 3 distributes content information periodically or upon request from the PC home server device 1”), ¶51 (“server device 1 is equipped with a distribution information database, and stores and holds content information such as electronic newspapers obtained from the information distribution server 3 via the Internet 5”) .

164. Sasaki's server device 1 includes a telephone network interface 108 for connecting to the public telephone network 4 and Internet 5:

[FIG. 3]



EX1006, FIG. 3, ¶65 (“FIG. 3 shows an example of the configuration of PC home server device1[sic]” which is shown in include “interface 108 for connecting to the public telephone network 4”), ¶46 (“The information distribution server device 3 and the PC home server device 1 are connected via the Internet 5 and the public telephone network 4”).

E. Claim 4

165. In my opinion, Sasaki renders this claim obvious.

1. [4pre] A contents reproducing system comprising:

166. In my opinion, Sasaki discloses this limitation. §V(B)(1) (limitation 1pre).

2. [4a] a main terminal;

167. In my opinion, Sasaki discloses this limitation. §V(B)(2) (limitation 1a).

3. [4b] first subsidiary terminal; and

168. In my opinion, Sasaki discloses this limitation. This limitation has been recast from “a plurality of subsidiary terminals” to “first subsidiary terminal.” Nevertheless, in my opinion, Sasaki discloses a first subsidiary terminal, such as a first PDA. §V(B)(3) (limitation 1b).

4. [4c] second subsidiary terminal,

169. In my opinion, Sasaki discloses this limitation. This limitation has been recast from “a plurality of subsidiary terminals” to “second subsidiary terminal.” Nevertheless, in my opinion, Sasaki discloses second subsidiary terminal, such as a second PDA. §V(B)(3) (limitation 1b).

5. [4d] wherein the main terminal comprises: a storage storing the contents;

170. In my opinion, Sasaki discloses this limitation. §V(B)(4) (limitation 1c).

6. [4e] [wherein the main terminal comprises...] a first display displaying the contents; and

171. In my opinion, Sasaki discloses this limitation. §V(B)(5) (limitation 1d).

7. **[4f] [wherein the main terminal comprises...] a first controller controlling transmission/reception with the first subsidiary terminal and the second subsidiary terminal,**

172. In my opinion, Sasaki discloses this limitation. This limitation has been recast from reciting “with the subsidiary terminals” to “with the first subsidiary terminal and the second subsidiary terminal.” Nevertheless, in my opinion, Sasaki discloses this limitation with respect to the first subsidiary terminal and the second subsidiary terminal. §V(B)(6) (limitation 1e).

8. **[4g] wherein the first controller is configured to: store first device specific identification (ID) information of the first subsidiary terminal and second device specific ID information of the second subsidiary terminal,**

173. In my opinion, Sasaki discloses this limitation. This limitation has been recast from reciting “a plurality of device specific identification (ID) information of the subsidiary terminals” to “with the first subsidiary terminal and the second subsidiary terminal.” Nevertheless, in my opinion, Sasaki discloses this limitation with respect to the first subsidiary terminal (e.g., first PDA). §V(B)(7) (limitation 1f).

9. **[4h] [wherein the first controller is configured to...] store first content information for identifying first content among the contents and second content information for identifying second content among the contents, and**

174. In my opinion, Sasaki discloses this limitation. This limitation has been recast from reciting “a plurality of content information” to “first content information for identifying first content among the contents and second content

information for identifying second content among the contents.” Nevertheless, in my opinion, Sasaki discloses this limitation. §V(B)(8) (limitation 1g).

10. [4i] [wherein the first controller is configured to...] store association information for transmitting one of the first content or the second content to one of the first subsidiary terminal or the second subsidiary terminal,

175. In my opinion, Sasaki discloses this limitation. This limitation has been recast from reciting “store association information for transmitting one of the contents to one of the subsidiary terminals” to “store association information for transmitting one of the first content or the second content to one of the first subsidiary terminal or the second subsidiary terminal.” Nevertheless, in my opinion, Sasaki discloses this limitation as “one of the first content or the second content” is the same as “one of the contents” and “one of the first subsidiary terminal or the second subsidiary terminal” is the same as “to one of the subsidiary terminals.” §V(B)(9) (limitation 1h).

11. [4j] wherein the association information defines that one of the first content or the second content is associated with one of the first device specific ID information or the second device specific ID information,

176. In my opinion, Sasaki discloses this limitation. This limitation has been recast from reciting “the association information defines that one of the contents identified by the content information is associated with one of the device specific ID information” to “the association information defines that one of the

first content or the second content is associated with one of the first device specific ID information or the second device specific ID information.” Nevertheless, in my opinion, Sasaki discloses this limitation as “one of the first content or the second content” is the same as “one of the contents” and “one of the first device specific ID information or the second device specific ID information” is the same as “one of the subsidiary terminals.” §V(B)(10) (limitation 1i).

12. [4k] wherein the first subsidiary terminal comprises: a second display displaying the content; and

177. In my opinion, Sasaki discloses this limitation. §V(B)(11) (limitation 1j).

13. [4l] [wherein the first subsidiary terminal comprises...] a second controller controlling transmission/reception with the main terminal, the second controller storing the first device specific ID information for identifying the first subsidiary terminal and transmitting the first device specific ID information to the main terminal when connecting to the main terminal,

178. In my opinion, Sasaki discloses this limitation. §V(B)(12) (limitation 1k).

14. [4m] wherein the second subsidiary terminal comprises: a third display displaying the content; and

179. In my opinion, Sasaki discloses this limitation. §V(B)(11) (limitation 1j).

15. [4n] [wherein the second subsidiary terminal comprises...]a third controller controlling transmission/reception with the main terminal, the third controller storing the second device

specific ID information for identifying the second subsidiary terminal and transmitting the second device specific ID information to the main terminal when connecting to the main terminal, and wherein,

180. In my opinion, Sasaki discloses this limitation. §V(B)(12) (limitation 1k).

16. **[4o] when the association information defines that the first content is associated with the first device specific ID information and the second content is associated with the second device specific ID information, the main terminal transmits the first content to the first subsidiary terminal and transmits the second content to the second subsidiary terminal, and**

181. In my opinion, Sasaki discloses this limitation. §V(B)(13) (limitation 1l).

17. **[4p] when the association information defines that the second content is associated with the first device specific ID information and the first content is associated with the second device specific ID information, the main terminal transmits the second content to the first subsidiary terminal and transmits the first content to the second subsidiary terminal.**

182. In my opinion, Sasaki discloses this limitation. §V(B)(13) (limitation 1l).

VI. GROUND 3: CLAIMS 1-4 ARE OBVIOUS IN VIEW OF FUTA AND MCCLELLAN

A. Overview of Futa

183. U.S. Patent Appl. Pub. No. 2004/0010687 (“Futa”) was filed June 10, 2003, and published January 15, 2004. EX1009, cover page. Futa is prior art under 35 U.S.C. §§102(a), (b), (e) (pre-AIA).

184. Futa discloses a content distributing system 1 for distributing content to viewers. EX1009, ¶49 (“FIG. 1 shows the construction of the content distributing system 1” which includes “broadcast receiving device 10, a TV (television) 20, a PC (personal computer) 30, a data-communication controlling device 40, a table updating server 50, and a broadcast device 60”). Broadcast receiving device 10 and data-communication controlling device 40 function as a main terminal that receives content from broadcast device 60 and distributes that content to a plurality of subsidiary devices that include TV 20 and PC 30. EX1009, ¶50 (“broadcast receiving device 10 receives and stores content that is broadcasted from the device 60...receives a request for playing back content...from the TV 20 or the PC 30...and transmits the requested content to the data-communication controlling device 40”).

185. In my opinion, Futa is analogous art to the ’650 patent because (1) Futa is from the same field of endeavor as the ’650 patent and (2) they are both patents in the area of content delivery systems. In addition, Futa is reasonably

relevant to the problem the patent is concerned with, as shown in my analysis below.

186. Based on my review of the '650 patent's prosecution history (EX1003), Futa appears to have not been considered during prosecution of the '650 patent.

B. Overview of McClellan

187. U.S. Patent No. 5,619,250 ("McClellan") was filed June 7, 1995, and published April 8, 1997. EX1010, cover page. McClellan is prior art under 35 U.S.C. §§102(a), (b), (e) (pre-AIA).

188. McClellan is generally directed to "set top boxes for use in an interactive television system." EX1010, 1:26-27. McClellan's set top box includes "a minimal system...which provides just enough functionality for the set top box to connect with the interactive television system." EX1010, 3:23-26. McClellan discloses that set top boxes can be incorporated inside the television. EX1010,

189. In my opinion, McClellan is analogous art to the '650 patent because (1) McClellan is from the same field of endeavor as the '650 patent and (2) they are both patents in the area of content delivery systems. In addition, McClellan is reasonably relevant to the problem the patent is concerned with, as shown in my analysis below.

190. Based on my review of the '650 patent's prosecution history (EX1003), McClellan does not appear to have been considered during prosecution of the '650 patent.

C. Overview of Cooper

191. U.S. Patent App. Pub. No. 2004/0231003 ("Cooper") was filed on June 21, 2004, and published on November 18, 2004. EX1011, cover page. Cooper is prior art under 35 U.S.C. §102(a), (b), and (e) (pre-AIA).

192. Cooper discloses communicating to a user the television programs and/or networks being watched by other users using an interface (*e.g.*, a buddy list) that presents a list of users alongside distinct identifiers indicating the program and/or network each user is watching. EX1011, Abstract, ¶60. Cooper's television is coupled to a set-top box that receives TV signals and supports network communication, granting users the ability to watch TV programming and engage with server-based content, such as buddy list 1110. EX1011, ¶¶38-42.

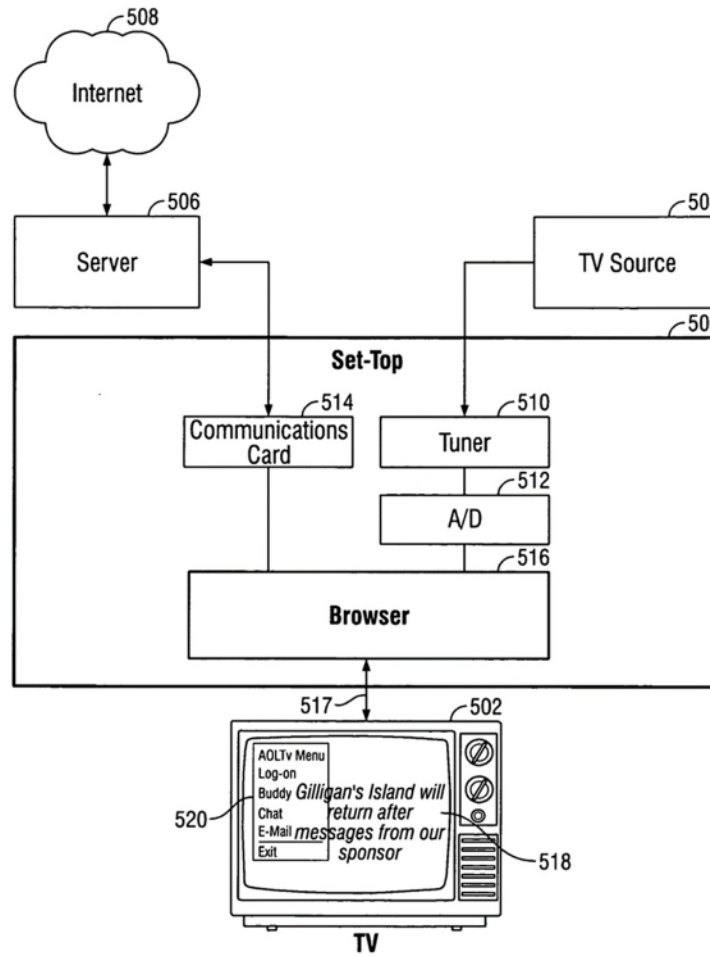


FIG. 5

EX1011, FIG. 5. Cooper acknowledges that it was well-known in the art, as of the alleged date of invention of Cooper, that set-top boxes function as general purpose computers with the extra functionality of a TV tuner. *See, e.g.*, EX1011, ¶11 (“Set-top box essentially has the same basic components as the general purpose computer illustrated in FIG. 1, except that it also includes a TV tuner for receiving broadcast and/or cable TV signals”). Cooper further acknowledges that it was well-known in the art, as of the alleged date of invention of Cooper, that set-top boxes

are not limited to boxes placed on top of a television. EX1011, ¶11 (“The term set-top box derives from the usual placement of the device on top of a television. The term, however, should not be construed literally. That is, a set-top box may neither be a box nor be placed on top of a display”).

193. In my opinion, Cooper is analogous art to the '650 patent because (1) Cooper is from the same field of endeavor as the '650 patent and (2) they are both patents in the area of content delivery systems. In addition, Cooper is reasonably relevant to the problem the patent is concerned with, as shown in my analysis below.

194. Based on my review of the '650 patent's prosecution history (EX1003), Cooper does not appear to have been considered during prosecution of the '650 patent.

D. Motivation to Combine

195. In my opinion, a POSITA would have been motivated to modify the teachings of Futa (§VI(A)) based on the teachings of McClellan §(VI(B)) because Futa discloses components – broadcast receiving device 10 and data-communication controlling device 40 – that function as a main terminal and McClellan discloses a main terminal in the form a multi-media computer otherwise referred to as a set-top box. EX1010, 1:64-66 (“computer/decoders for the interactive television systems have become known as set top boxes”), 2:46-58. It

was well-known in the art, as of the alleged date of the invention of the '650 patent, that set-top boxes function as general purpose computers with the extra functionality of a TV tuner. *See, e.g.*, EX1011, ¶11 (“Set-top box essentially has the same basic components as the general purpose computer illustrated in FIG. 1, except that it also includes a TV tuner for receiving broadcast and/or cable TV signals”). From this, in my opinion, a POSITA would have been motivated by the teachings of McClellan to incorporate Futa’s broadcast receiving device 10 and data-communication controlling device 40 into a television because Futa’s broadcast receiving device and data-communication controlling device 40 collectively function as a set top box as known in the art. EX1009, ¶53 (“broadcast receiving device 10 functions as a server”), ¶¶277-280, ¶56 (“receiving unit 101 includes an antenna, and receives, via the antenna, a digital broadcast wave that is broadcasted from the broadcast device 60 via the broadcast satellite 80”), FIG. 2. Such a combination involves the simple movement of components (broadcast receiving device 10, data-communication controlling device 40) into a television system (McClellan’s television system) to obtain predictable results (providing consumers with a television system that includes an integrated set top box). Accordingly, in my opinion, a POSITA would have had a reasonable expectation of success in making the proposed combination given the teachings of Futa and McClellan, as guided by Cooper. Such a combination would have required

minimal modifications to Futa, and thus would have been well within the skillset of a POSITA. In my opinion, the proposed combination would not have required undue experimentation and would have yielded a predictable result.

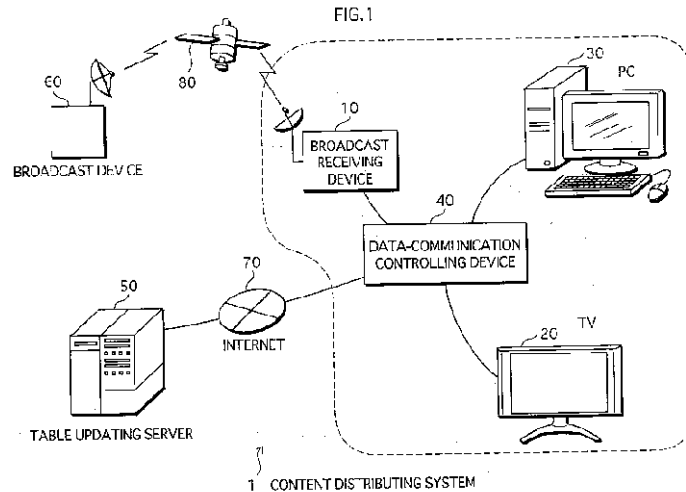
196. I have been asked to consider the circumstance that PO argues the portions of Futa or McClellan cited below relate to different, incompatible embodiments—in my opinion, they do not relate to different, incompatible embodiments. In the circumstance that this is nonetheless argued, in my opinion, it would have been obvious to a POSITA to combine such embodiments into a single system for providing the ability to deliver content at least because such embodiments are described in the same prior art reference, are fully compatible with each other, and could be combined with minimal effort to achieve predictable results.

E. Claim 1

197. In my opinion, Futa renders this claim obvious alone or in combination with McClellan.

1. [1pre] A contents reproducing system comprising:

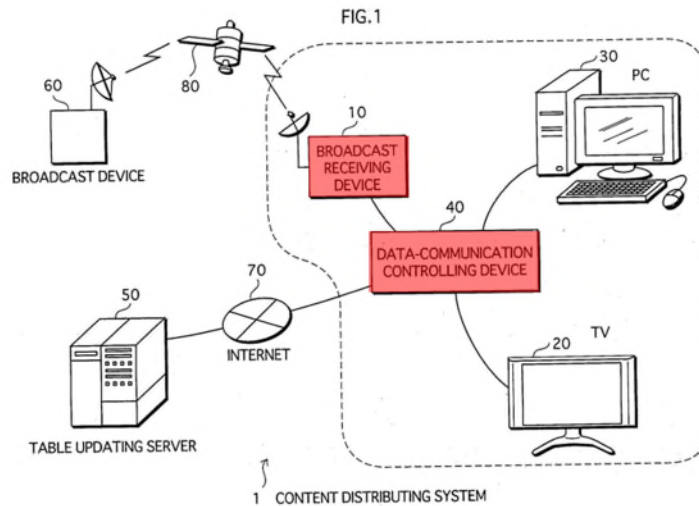
198. In my opinion, Futa discloses *a contents reproducing system* (content distribution system 1):



EX1009, FIG. 1, ¶49 (“FIG. 1 shows the construction of the content distributing system 1...composed of a broadcast receiving device 10, a TV...20, a PC...30, a data communication controlling device 40, a table updating server 50, and a broadcast device 60”), ¶50 (“broadcast receiving device 10 receives and stores content that is broadcasted from the device 60...receives a request for playing back content...from the TV 20 or the PC 30...and transmits the requested content to the data-communication controlling device 40”), ¶264 (“The present invention also includes the construction where the broadcast receiving device 10 includes the data-communication controlling device 40...the broadcast receiving device 10 may have a construction and function of the data-communication controlling device 40”), ¶53 (“broadcast receiving device 10 receives a request for playing back content...from the TV 20 or the PC 30 via the data-communication controlling device 40, and transmits the requested content to the data-communication controlling device 40”).

2. [1a] a main terminal; and

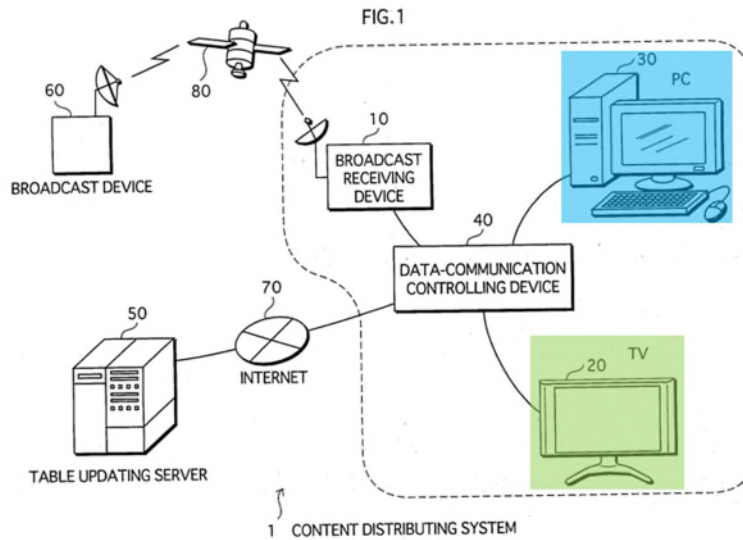
199. In my opinion, Futa discloses *a main terminal* (collectively, broadcast receiving device 10, data-communication controlling device 40 (both red)):



EX1009, ¶ 49 (“content distributing system 1...composed of a broadcast receiving device 10..., a data communication controlling device 40”), ¶264 (“The present invention also includes the construction where the broadcast receiving device 10 includes the data-communication controlling device 40...the broadcast receiving device 10 may have a construction and function of the data-communication controlling device 40”).

3. [1b] a plurality of subsidiary terminals,

200. In my opinion, Futa discloses *a plurality of subsidiary terminals* (PC 30 (blue), TV 20 (green)):



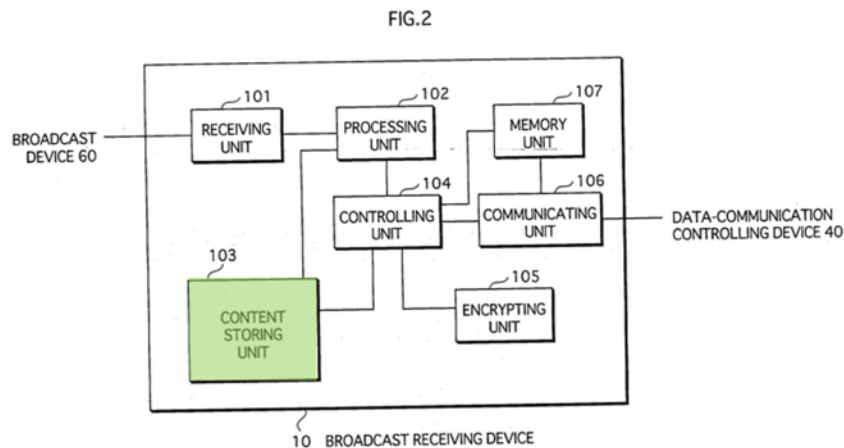
EX1009, FIG. 1, ¶49 (“content distributing system 1...composed of...a TV...20, a PC...30”), ¶50 (“broadcast receiving device 10 receives...a request for playing back content...from the TV 20 or the PC 30”), FIGS. 4-5.

4. [1c] wherein the main terminal comprises: a storage storing the contents;

201. In my opinion, Futa discloses *wherein the main terminal* (collectively, broadcast receiving device 10, data-communication controlling device 40) *comprises...a storage* (content storing unit 103) *storing the contents* (content).

EX1009, FIG. 2, ¶60.

202. Futa’s broadcast receiving device 10 includes a content storing unit 103 (green) that stores content:



EX1009, FIG. 2, ¶60 (“stores content that is outputted from the processing unit 102”).

5. [1d] [wherein the main terminal comprises...] a first display displaying the contents; and

203. In my opinion, Futa-McClellan combination discloses *wherein the main terminal* (broadcast receiving device 10, data-communication controlling device 40) *comprises...a first display* (TV display) *displaying the contents* (content). EX1009, ¶53, ¶56, ¶¶277-280, FIG. 2; EX1010, 2:1-5, EX1011, ¶11; §VI(C) (motivation to combine).

204. Futa discloses broadcast receiving device 10 and data-communication controlling device 40. §VI(D)(2) (limitation 1a). While Futa does not explicitly disclose that broadcast receiving device 10 and data communication controlling device 40 have a display for displaying contents, in my opinion, McClellan does.

205. McClellan discloses that interactive television systems, such as set-top boxes, can reside inside the television housing itself. EX1010, 2:1-5 (“These computer/decoders, or set top boxes, for the interactive television systems also can reside inside the television housing itself in a fashion similar to the cable boxes which originally resided outside in a separate box but now are incorporated inside the television housings”). As the foregoing indicates, set-top boxes were well known as of the alleged date of invention and function like a general purpose computer with the added functionality of a tuner. §VI(C) (motivation to combine); EX1011, ¶11 (“Set-top box essentially has the same basic components as the general purpose computer illustrated in FIG. 1, except that it also includes a TV tuner for receiving broadcast and/or cable TV signals”). Futa’s broadcast receiving device 10 and data-communication controlling device 40 function as a general-purpose computer with the added functionality of receiving unit 101 for receiving broadcast TV signals from broadcast device 60. EX1009, ¶53 (“broadcast receiving device 10 functions as a server”), ¶¶277-280, ¶56 (“receiving unit 101 includes an antenna, and receives, via the antenna, a digital broadcast wave that is broadcasted from the broadcast device 60 via the broadcast satellite 80”), FIG. 2. Therefore, in my opinion, a POSITA would have understood and found obvious to modify Futa’s content distribution system to have broadcast receiving device 10 and data-communication controlling device 40 incorporated into a television.

Therefore, broadcast receiving device 10 and data-communication controlling device are embodied inside a television and include a display.

206. In my opinion, a POSITA would have understood and found obvious that Futa's modified main terminal is capable of displaying contents because Futa's main terminal can display the contents it has stored on its own display.

6. [1e] [wherein the main terminal comprises...] a first controller controlling transmission/reception with the subsidiary terminals,

207. In my opinion, Futa discloses *wherein the main terminal* (broadcast receiving device 10, data-communication controlling device 40) *comprises...a first controller* (collectively, controlling unit 104, communication controlling unit 407) *controlling transmission/reception with the subsidiary terminals* (TV 20, PC 30). EX1009, ¶54, ¶68, ¶138, ¶¶141-143, ¶161, FIG. 6.

208. In my opinion, Futa's broadcast receiving terminal 10 includes controlling unit 104. EX1009, ¶54, FIG. 6. Controlling unit 104 "controls the entire data-communication controlling device 40 by its CPU executing a computer program stored in ROM." EX1009, ¶68. Futa's data-communication controlling device 40 includes communication controlling unit 407. EX1009, ¶138, FIG. 6. Communication controlling unit 407 "controls the entire data-communication controlling device 40 by its CPU executing a computer program stored in ROM." EX1009, ¶161.

209. In my opinion, Data-communication controlling device includes communicating units 402-403. EX1009, ¶138, FIG. 6. Communicating unit 402 sends transmissions to TV 20. EX1009, ¶142 (“communicating unit 402...transmits the packets one after another to the TV 20”). Communicating unit 402 receives transmissions from TV 20. EX1009, ¶141 (“communicating unit 402 receives the device ID “IDA” and the certificate “CIDA” from the TV 20”). Communicating unit 403 sends transmissions to PC 30. EX1009, ¶143 (“communicating unit 403...transmits the packets one after another to the PC 30”). Communication unit 403 receives transmissions from PC 30. EX1009, ¶143 (“communicating unit 403 receives the device ID...and the certificate...from the PC 30”).

210. Therefore, in my opinion, Futa’s controlling unit 104 and communication controlling unit 407 collectively control transmission/reception with the TV 20 and PC 30 (subsidiary terminals).

7. [1f] wherein the first controller is configured to: store a plurality of device specific identification (ID) information of the subsidiary terminals,

211. In my opinion, Futa discloses wherein the first controller (collectively, communication controlling unit 407, controlling unit 104) is configured to...store a plurality of device specific identification (ID) information (device ID) of the

subsidiary terminals (TV 20, PC 30). EX1009, ¶140, ¶143, ¶¶169-171, FIGS. 7-8B.

212. Futa's data-communication controlling device 40 receives device IDs from TV 20 and PC 30. EX1009, ¶140 ("communicating unit 402 receives the device ID 'IDA' and the certificate 'CIDA' from the TV 20"), ¶143 ("communicating unit 403 receives the device ID "IDB" and the certificate "CIDB" from the PC 30"). Data-communication controlling device 40 stores the device IDs of TV 20 and PC 30. EX1009, ¶169 ("communication controlling unit 407 internally prestores judgment tables 'A' and 'B'" and "writes a device ID into the judgment tables "A" and/or "B", every time when a device establishes connection to the data-communication controlling device 40 via a LAN cable", ¶¶170-171. FIGS. 7-8B (illustrating exemplary judgment tables) .

8. [1g] [wherein the first controller is configured to...] store a plurality of content information for identifying each of the contents, and

213. In my opinion, Futa discloses *wherein the first controller* (collectively, communication controlling unit 407, controlling unit 104) *is configured to...store a plurality of content information (content ID) for identifying each of the contents (contents).* EX1009, ¶54, ¶¶61-62, FIGS. 2-3.

214. Futa's broadcast receiving device 10 includes a content storing unit 103 in which controlling unit 104 stores content IDs for the content. EX1009, ¶54

(“FIG. 2 is a block diagram showing the construction of the broadcast receiving device 10. As shown in the figure, the broadcast receiving device 10 comprises a receiving unit 101, a processing unit 102, a content storing unit 103”), ¶61 (“content 150 shown in FIG. 3 is one example of content stored in the content storing unit 103” and “is composed of header information” which “includes ‘content ID’ 151”), ¶62 (“‘content ID’ is an ID used to uniquely identify content”), FIGS. 2-3.

9. [1h] [wherein the first controller is configured to...] store association information for transmitting one of the contents to one of the subsidiary terminals,

215. In my opinion, Futa discloses wherein the first controller (collectively, communication controlling unit 407, controlling unit 104) is configured to...store association information (judgment table) for transmitting one of the contents (content) to one of the subsidiary terminals (TV 20). EX1009, ¶169, ¶171, ¶¶211-212, FIG. 11.

216. Futa’s communication controlling unit maintains judgment tables for determining which content to send to TV 20 or PC 30. EX1009, ¶169 (“communication controlling unit 407 internally prestores judgment tables ‘A’ and ‘B’” and “writes a device ID into the judgment tables ‘A’ and/or ‘B’, every time when a device establishes connection to the data-communication controlling device 40”). Each judgment table is associated with a category of content deliverable to

the device. EX1009, ¶171 (“communication controlling unit 407 reads category information included in the device ID...[w]hen the category information is ‘1’, the communication controlling unit 407 writes the device ID...into the judgment table ‘A’...[w]hen the category information is ‘2’, the communication controlling unit 407 writes the device ID...into both the judgment tables ‘A’ and ‘B’”). The communication controlling unit for transmitting content to the requesting device. EX1009, ¶211 (“communication controlling unit 407 of the data-communication controlling device 40 refers to its internally-stored address conversion table, and obtains a device ID corresponding to the transmission target address received from the broadcast receiving device 10 (step S301)”), ¶211 (“the communication controlling unit 407 reads additional information from header information included in the encrypted content received from the broadcast receiving device 10, and checks the additional information (step S302)”), ¶212 (“When the additional information is “1” (“1” in step S303), the communication controlling unit 407 reads the internally-stored judgment table “A” (step S304). When the additional information is “2” (“2” in step S303), the communication controlling unit 407 reads the internally-stored judgment table “B” (step S305)”), ¶212 (“device ID being included in the judgment table means that the content is permitted to be transmitted, whereas the device ID not being included in the judgment table means that the content is not permitted to be transmitted.”), FIG. 11.

10. [1i] wherein the association information defines that one of the contents identified by the content information is associated with one of the device specific ID information,

217. In my opinion, Futa discloses wherein the association information (judgment table) defines that one of the contents (content) identified by the content information (content ID) is associated with one of the device specific ID information (device ID). §§VI(B)(7)-(8) (limitations 1f-1g). EX1009, ¶¶176-180, ¶¶205-207, ¶212, FIG. 11.

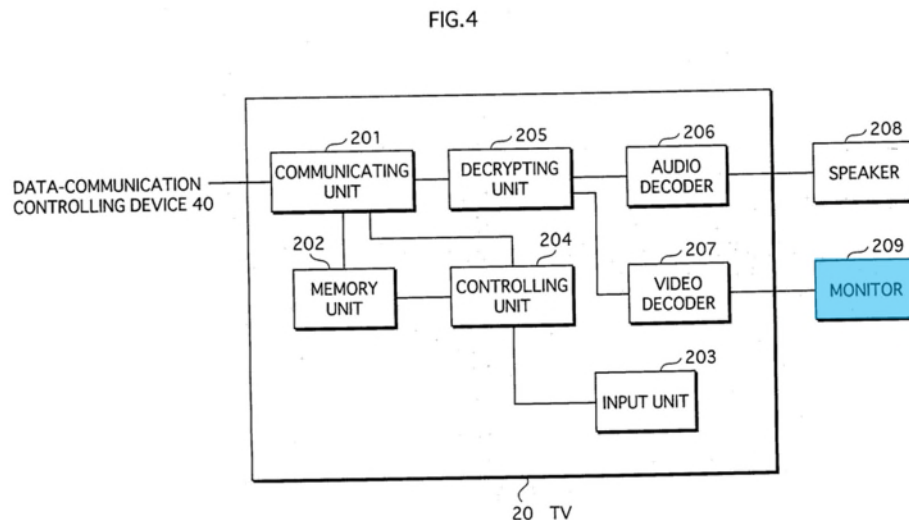
218. Futa's judgment tables define whether a device can receive the content that it requested. EX1009, ¶212 ("device ID being included in the judgment table means that the content is permitted to be transmitted, whereas the device ID not being included in the judgment table means that the content is not permitted to be transmitted."). In operation, "TV 20 or the PC 30 transmits a content request including as content ID, and its internally-stored network address, to the broadcast receiving device 10 via the data-communication controlling device." EX1009, ¶205. Broadcast receiving device 10 then identifies the requested content based on the content ID and sends the requested content to data-communication controlling device 40. EX1009, ¶206 ("broadcast receiving device 10 reads content identified by the content ID included in the content request, from the content storing unit 103...encrypts the read content....[and] transmits the encrypted content and the transmission target address, to the data-communication

controlling device 40”). Data-communication controlling device 40 then uses the judgment tables to determine whether a device (e.g., TV 20, PC 30) is associated with the content based on the device ID of that device. EX1009, ¶¶176-180, ¶207 (“data-communication controlling device 40 judges whether the encrypted content is permitted to be transmitted to a device having the received transmission target address”), FIG. 11.

11. [1j] wherein the plurality of subsidiary terminals comprise: a second display displaying the content; and

219. In my opinion, Futa discloses *wherein the plurality of subsidiary terminals (TV 20, PC 40) comprise...a second display (monitor 209) displaying the content (content)*. EX1009, ¶50, ¶86, ¶110, ¶113, ¶135, FIGS. 4-5.

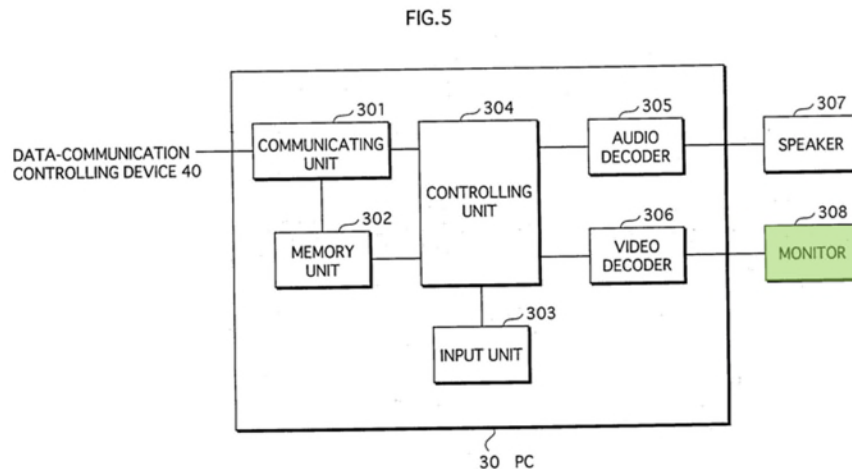
220. Futa’s TV 20 includes a monitor (blue) for displaying the content:



EX1009, FIG. 4, ¶86 (“TV 20 is composed of...a monitor 209”), ¶110 (“video decoder 207 receives a video stream from the decrypting unit 205, expands the

received video stream to a video signal, and outputs the video signal to the monitor 209”), ¶50 (“TV 20, the PC 30...are devices placed in a home of the user who views and/or listens to content”).

221. Futa’s PC 30 includes a monitor (green) for displaying the content:



EX1009, FIG. 5, ¶113 (“PC 30 is composed of...a monitor 308”), ¶135 (“video decoder 306 receives a video stream from the controlling unit 304, expands the received video stream to a video signal, and outputs the video signal to the monitor 308”), ¶50.

12. [1k] [wherein the plurality of subsidiary terminals comprise...] a second controller controlling transmission/reception with the main terminal, the second controller storing device specific ID information for identifying the subsidiary terminal and transmitting the device specific ID information to the main terminal when connecting to the main terminal, and

222. In my opinion, Futa discloses this limitation. EX1009, ¶86, ¶¶88-91, ¶94, ¶100, ¶¶113-118, ¶121, ¶127, FIGS. 4-5.

223. In my opinion, Futa discloses *wherein the plurality of subsidiary terminals* (TV 20, PC 30) *comprise...a second controller* (controlling unit 204, controlling unit 304) controlling transmission/reception with the main terminal (collectively, broadcast receiving device 10, data-communication controlling device 40). EX1009, ¶86, ¶88, ¶¶90-91, ¶100, ¶¶113-118, ¶127, FIGS. 4-5 .

224. Futa's TV 20 includes controlling unit 204. EX1009, ¶86, FIG. 4. Controlling unit 204 "controls the entire TV 20 by its CPU executing a computer program stored in its ROM." EX1009, ¶100. Futa's TV 20 includes communicating unit 201. EX1009, ¶86, FIG. 4. Communicating unit 201 controls communications with data-communication controlling device 40. EX1009, ¶88 ("communicating unit 201 is a LAN-connected unit including an IEEE1394 connector and the like"), ¶90 ("communicating unit 201 receives a network address...from the data-communication controlling device 40"), ¶91 ("communicating unit 201...transmits the...content request and network address...to the data-communication controlling device 40").

225. Futa's PC 30 includes controlling unit 304, EX1009, ¶113, FIG. 5, which "controls the entire PC 30 by its CPU executing a computer program stored in its ROM." EX1009, ¶127. Futa's PC 30 includes communicating unit 301. EX1009, ¶113, FIG. 5. Communicating unit 201 controls communications with data-communication controlling device 40. EX1009, ¶115 ("communicating unit

301 is a LAN-connected unit including an IEEE1394 connector and the like”), ¶117 (“communicating unit 301 receives a network address...from the data-communication controlling device 40”), ¶118 (“communicating unit 301...transmits the...content request and network address...to the data-communication controlling device 40”).

226. In my opinion, Futa discloses *the second controller* (controlling unit 204, controlling unit 304) *storing device specific ID information* (device ID) *for identifying the subsidiary terminal* (TV 20, PC 30). EX1009, ¶89, ¶94, ¶116, ¶121.

227. Futa’s controlling unit 204 stores its device ID that identifies itself – TV 20. EX1009, ¶89 (“the communicating unit 201 reads a device ID...stored in the memory unit 202”), ¶94 (“In the memory unit 202, the network address...the device ID...and the certificate...are stored”), ¶94 (“device ID...is composed of a MAC address assigned to a NIC at the time of manufacture, and category information indicating a category of the device”). Futa’s controlling unit 304 stores its device ID that identifies itself – PC 30. EX1009, ¶116 (“communicating unit 301 reads a device ID...stored in the memory unit 202”), ¶121 (“In the memory unit 302, the network address...the device ID...and the certificate...are stored”), ¶121 (“device ID...is composed of a MAC address assigned to a NIC at the time of manufacture, and category information indicating a category of the device”).

228. In my opinion, Futa discloses *the second controller* (controlling unit 204, controlling unit 304)...*transmitting the device specific ID information* (device ID) *to the main terminal* (collectively, communication controlling unit 407, controlling unit 104) *when connecting to the main terminal* (collectively, broadcast receiving device 10, data-communication controlling device 40). EX1009, ¶89, ¶116.

229. Futa's controlling unit 204 sends its device ID to data-communication controlling device 40 when connecting to data-communication controlling device 40. EX1009, ¶89 ("When the communicating unit 201 is newly connected to the home network by establishing connection to the data-communication controlling unit 40 via a LAN cable, communicating unit 201 reads a device ID...and a certificate...stored in the memory unit 202, and transmits the read device ID ...and certificate...to the data-communication controlling device 40"). Futa's controlling unit 304 sends its device ID to data-communication controlling device 40 when connecting to data-communication controlling device 40. EX1009, ¶116 ("When the communicating unit 301 is newly connected to the home network by establishing connection to the data-communication controlling unit 40 via a LAN cable, communicating unit 301 reads a device ID...and a certificate...stored in the memory unit 302, and transmits the read device ID ...and certificate...to the data-communication controlling device 40").

13. [11] wherein, the main terminal determines whether it is possible to connect to the subsidiary terminal storing the device specific ID information, and transmits the content³ stored in the storage to the subsidiary terminal which can be connected, based on the association information then the subsidiary terminal reproduces the received content on the second display.

230. Futa discloses this limitation. EX1009, ¶¶199-200, ¶¶205-206, ¶212.

231. In my opinion, Futa discloses *wherein, the main terminal* (broadcast receiving device 10, data-communication controlling device 40) *determines whether it is possible to connect to the subsidiary terminal* (TV 20, PC 40) *storing the device specific ID information* (device ID). EX1009, ¶¶199-200.

232. Futa's data-communication controlling device 40 determines whether it is possible to connect to TV 20 or PC 30 based on the certificate received from TV 20 or PC 30. EX1009, ¶199 ("TV 20, or the PC 30 reads its internally-stored device ID and certificate, and transmits the read device ID and certificate to the communication controlling device 40"), ¶200 ("data- communication controlling device 40 authenticates the received certificate (step S102). When the authentication is unsuccessful ("NO" in step S103), the data-communication

³ Based on my review of the claim, it is unclear what "the content" refers back to. Accordingly, I have shown that "the content" can refer to both "the contents" described limitation 1d or "one of the contents" in limitations 1h-1i.

controlling device 40 revokes the received device ID and certificate, and the process ends. When the authentication is successful (“YES” in step S103), the data-communication controlling device 40 assigns a network address (step S105)”), FIG. 9.

233. In my opinion, Futa discloses *the main terminal* (broadcast receiving device 10, data-communication controlling device 40)...*transmits the content* (content) *stored in the storage* (content storing unit 103) *to the subsidiary terminal* (TV 20, PC 40) *which can be connected, based on the association information* (judgment tables). EX1009, ¶¶205-206, ¶212.

234. Following authentication, Futa’s data communication controlling device 40 sends content stored in content storing unit 103 to TV 20 or PC 40 based on the judgement tables. EX1009, ¶205 (“TV 20 or the PC 30 transmits a content request including as content ID, and its internally-stored network address, to the broadcast receiving device 10 via the data-communication controlling device”), ¶206 (“broadcast receiving device 10 reads content identified by the content ID included in the content request, from the content storing unit 103...encrypts the read content....[and] transmits the encrypted content and the transmission target address, to the data-communication controlling device 40”), ¶212 (“device ID being included in the judgment table means that the content is permitted to be

transmitted, whereas the device ID not being included in the judgment table means that the content is not permitted to be transmitted.”).

F. Claim 2 - The contents reproducing system according to claim 1, wherein the main terminal includes a converter down-converting the content and transmits the down-converted content to the subsidiary terminal.

235. In my opinion, the Futa-McClellan combination renders this claim obvious.

236. As I explain above, the Futa-McClellan combination discloses *the contents reproducing system according to claim 1*. See §VI(B) (claim 1).

237. In my opinion, Futa discloses *wherein the main terminal* (broadcast receiving device 10, data-communication controlling device 40) *includes a converter down-converting the content* (content) *and transmits the down converted content to the subsidiary terminal* (TV 20, PC 30). In my opinion, a POSITA would have understood and found obvious that Futa’s broadcast receiving device 10 and data-communication controlling device, collectively, can down-convert content and transmit the down converted content to the subsidiary terminal as evidenced by Shindo and Sasaki. §IV(C), §V(C) (claim 2).

G. Claim 3 - The contents reproducing system according to claim 1, wherein the main terminal includes a network interface and

acquires the content from an external server via the network interface.

238. In my opinion, the Futa-McClellan combination renders this claim obvious.

239. As I explain above, the Futa-McClellan combination discloses *the contents reproducing system according to claim 1. See §VI(B) (claim 1).*

240. In my opinion, Futa discloses *wherein the main terminal (broadcast receiving device 10, data-communication controlling device 40) includes a network interface and acquires the content from an external server via the network interface.* Futa discloses that broadcast receiving device 10 includes a receiving unit 101 for receiving content from broadcast device 60. EX1009, ¶¶54-56. In my opinion, a POSITA would have understood and found obvious that Futa's broadcast receiving device 10 and data-communication controlling device, collectively, can receive content from an external server via a network interface in addition to broadcast content from broadcast device 60 as evidenced by Shindo and Sasaki. §IV(D), §V(D) (claim 3).

H. Claim 4

241. In my opinion, the Futa-McClellan combination renders this claim obvious.

1. [4pre] A contents reproducing system comprising:

242. In my opinion, Futa discloses this limitation. §VI(B)(1) (limitation 1pre).

2. [4a] a main terminal;

243. In my opinion, Futa discloses this limitation. §VI(B)(2) (limitation 1a).

3. [4b] first subsidiary terminal; and

244. In my opinion, Futa discloses this limitation. This limitation has been recast from “a plurality of subsidiary terminals” to “first subsidiary terminal.” Nevertheless, in my opinion, Futa-McClellan combination discloses a first subsidiary terminal, such as a first PDA. §VI(B)(3) (limitation 1b).

4. [4c] second subsidiary terminal,

245. In my opinion, Futa discloses this limitation. This limitation has been recast from “a plurality of subsidiary terminals” to “second subsidiary terminal.” Nevertheless, in my opinion, Futa discloses a second subsidiary terminal, such as a second PDA. §VI(B)(3) (limitation 1b).

5. [4d] wherein the main terminal comprises: a storage storing the contents;

246. In my opinion, Futa discloses this limitation. §VI(B)(4) (limitation 1c).

6. **[4e] [wherein the main terminal comprises...] a first display displaying the contents; and**

247. In my opinion, Futa-McClellan combination discloses this limitation.

§VI(B)(5) (limitation 1d).

7. **[4f] [wherein the main terminal comprises...] a first controller controlling transmission/reception with the first subsidiary terminal and the second subsidiary terminal,**

248. In my opinion, Futa discloses this limitation. This limitation has been recast from reciting “with the subsidiary terminals” to “with the first subsidiary terminal and the second subsidiary terminal.” Nevertheless, in my opinion, Futa discloses this limitation with respect to the first subsidiary terminal and the second subsidiary terminal. §VI(B)(6) (limitation 1e).

8. **[4g] wherein the first controller is configured to: store first device specific identification (ID) information of the first subsidiary terminal and second device specific ID information of the second subsidiary terminal,**

249. In my opinion, Futa discloses this limitation. This limitation has been recast from reciting “a plurality of device specific identification (ID) information of the subsidiary terminals” to “with the first subsidiary terminal and the second subsidiary terminal.” Nevertheless, in my opinion, Futa discloses this limitation with respect to the first subsidiary terminal (e.g., first PDA). §VI(B)(7) (limitation 1f).

9. **[4h] [wherein the first controller is configured to...] store first content information for identifying first content among**

**the contents and second content information for identifying
second content among the contents, and**

250. In my opinion, Futa discloses this limitation. This limitation has been recast from reciting “a plurality of content information” to “first content information for identifying first content among the contents and second content information for identifying second content among the contents.” Nevertheless, in my opinion, Futa discloses this limitation. §VI(B)(8) (limitation 1g).

**10. [4i] [wherein the first controller is configured to...] store
association information for transmitting one of the first
content or the second content to one of the first subsidiary
terminal or the second subsidiary terminal,**

251. In my opinion, Futa discloses this limitation. This limitation has been recast from reciting “store association information for transmitting one of the contents to one of the subsidiary terminals” to “store association information for transmitting one of the first content or the second content to one of the first subsidiary terminal or the second subsidiary terminal.” Nevertheless, in my opinion, Futa discloses this limitation as “one of the first content or the second content” is the same as “one of the contents” and “one of the first subsidiary terminal or the second subsidiary terminal” is the same as “to one of the subsidiary terminals.” §VI(B)(9) (limitation 1h).

**11. [4j] wherein the association information defines that one of
the first content or the second content is associated with one**

**of the first device specific ID information or the second
device specific ID information,**

252. In my opinion, Futa discloses this limitation. This limitation has been recast from reciting “the association information defines that one of the contents identified by the content information is associated with one of the device specific ID information” to “the association information defines that one of the first content or the second content is associated with one of the first device specific ID information or the second device specific ID information.” Nevertheless, in my opinion, Futa discloses this limitation as “one of the first content or the second content” is the same as “one of the contents” and “one of the first device specific ID information or the second device specific ID information” is the same as “one of the subsidiary terminals.” §VI(B)(10) (limitation 1i).

**12. [4k] wherein the first subsidiary terminal comprises: a
second display displaying the content; and**

253. In my opinion, Futa discloses this limitation. §VI(B)(11) (limitation 1j).

**13. [4l] [wherein the first subsidiary terminal comprises...] a
second controller controlling transmission/reception with
the main terminal, the second controller storing the first
device specific ID information for identifying the first
subsidiary terminal and transmitting the first device
specific ID information to the main terminal when
connecting to the main terminal,**

254. In my opinion, Futa discloses this limitation. §VI(B)(12) (limitation 1k).

14. **[4m] wherein the second subsidiary terminal comprises: a third display displaying the content; and**

255. In my opinion, Futa discloses this limitation. §VI(B)(11) (limitation 1j).

15. **[4n] [wherein the second subsidiary terminal comprises...]a third controller controlling transmission/reception with the main terminal, the third controller storing the second device specific ID information for identifying the second subsidiary terminal and transmitting the second device specific ID information to the main terminal when connecting to the main terminal, and wherein,**

256. In my opinion, Futa discloses this limitation. §VI(B)(12) (limitation 1k).

16. **[4o] when the association information defines that the first content is associated with the first device specific ID information and the second content is associated with the second device specific ID information, the main terminal transmits the first content to the first subsidiary terminal and transmits the second content to the second subsidiary terminal, and**

257. In my opinion, Futa discloses this limitation. §VI(B)(13) (limitation 1l).

17. **[4p] when the association information defines that the second content is associated with the first device specific ID information and the first content is associated with the second device specific ID information, the main terminal transmits the second content to the first subsidiary terminal**

and transmits the first content to the second subsidiary terminal.

258. In my opinion, Futa discloses this limitation. §VI(B)(13) (limitation 1l).

VII. SECONDARY CONSIDERATIONS

259. I am not aware of any relevant information related to secondary considerations. For example, I am not aware of any attempt to commercialize the claimed technology in a product or through licensing. To the extent Patent Owner comes forward with any such information, I will consider it.

VIII. RIGHT TO SUPPLEMENT

260. I reserve the right to supplement my opinions in the future to respond to any arguments that the Patent Owner raises. This declaration represents only those opinions that I have formed to date. I reserve the right to revise, supplement, and/or amend my opinions stated herein based on new information that becomes available to me and only my continuing analysis of the materials already provided.

IX. CONCLUSION

261. I may utilize the documents cited and/or listed herein, or portions of those documents, as exhibits at any hearing or trial in this proceeding. I may further prepare and use exhibits that summarize portions of my testimony or key terms or concepts presented therein, or other demonstrative exhibits, at any hearing or trial in this proceeding.

262. I reserve the right to supplement my testimony and this report in response to any judicial determinations, in response to the arguments expressed by the Patent Owner or the opinions of the Patent Owner's experts in this proceeding, and/or in light of additional evidence or testimony brought forth at trial or otherwise brought to my attention after the date of my signature on the cover page.

EXHIBIT A

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

School of Architecture and Planning Faculty Personnel Record

Date: April 2025

Full Name: Joseph A. Paradiso

Department: Program in Media Arts and Sciences

1. **Date of Birth:** December 20, 1955

2. **Citizenship:** USA
Immigration Status: N/A

3. **Education:**

<u>School</u>	<u>Degree</u>	<u>Date</u>
MIT	Ph.D. in Physics	May, 1981
Tufts University	BS in Electrical Engineering and Physics	May, 1977

4. **Title of Thesis for Most Advanced Degree:**

Characteristics of Muon Pair Production in P-P Collisions at Very High Energies as a Probe of Proton Constituents

5. **Principal Fields of Interest:**

Sensor Applications and Sensor Networks
Ubiquitous Computing and the Internet of Things
Wearable Sensing Systems
Energy Harvesting for Embedded and Wearable Sensing
Human-Computer Interaction (HCI)
Augmented and Virtual Reality, Digital Twins
Energy Management in the Built Environment
Space Systems
Interactive Media and Electronic/Computer Music Generation & Performance

6. **Non-MIT Experience (including military service):**

<u>Employer</u>	<u>Position</u>	<u>Beginning</u>	<u>Ending</u>
Draper Laboratory Sensor and Signal Processing Directorate	Technical Staff	4/89	7/94
Swiss Federal Institute of Technology (ETH Zurich) Lab for High Energy Physics	Visiting Scientist	8/92	10/92
Swiss Federal Institute of Technology (ETH Zurich) Lab for High Energy Physics	Visiting Scientist	10/91	12/91
Draper Laboratory Control and Decision Systems Directorate	Technical Staff	2/84	4/89
Swiss Federal Institute of Technology (ETH Zurich) Lab for Nuclear Physics	Postdoc	11/81	12/83

Brookhaven National Laboratory Instrumentation Laboratory	Consulting Physicist	7/81	10/81
Draper Laboratory	Engineering Aide	6/74	9/77
Infoton, Inc.	Electronics Technician	1/73	9/73

7. History of MIT Appointments:

<u>Department</u>	<u>Rank</u>	<u>Beginning</u>	<u>Ending</u>
Media Arts and Sciences	Acting Academic Head	9/23	9/24
Media Arts and Sciences	Associate Academic Head	9/17	9/23
Media Arts and Sciences	Full Professor	7/15	present
Media Arts and Sciences	Associate Prof. w. Tenure	7/07	7/15
Media Arts and Sciences	Associate Professor	7/02	7/07
Media Arts and Sciences	Principal Research Scientist	7/98	7/02
Media Arts and Sciences	Research Scientist	7/94	7/98
Media Arts and Sciences	Research Affiliate	1/93	7/94
Physics Department	Compton Fellow	9/77	9/80
Physics Department	Research Associate	9/80	5/81

8. Consulting Record:

<u>Firm</u>	<u>Beginning</u>	<u>Ending</u>
Hive Robotics (advisor)	1/25	present
Nocturnal.health (advisor)	10/24	present
Samsung Electronics (Next Tech UX Global Expert Panel)	5/25	5/25
Buchalter (Technical Expert)	12/24	present
Unified Patents (Technical Expert)	4/23	present
Alston & Bird LLP (Technical Expert)	3/20	11/23
Gibson, Dunn & Crutcher LLP (Technical Expert)	3/20	1/21
Erse IP, P.A. (Technical Expert)	3/20	10/20
Neoteny Capital (Technical Consultant)	2/20	3/20
Paul Hastings, LLP (Technical Expert)	12/19	5/21
O'Melveny & Myers LLP (Technical Expert)	7/19	10/20
Covington & Burling LLP (Technical Expert)	8/18	7/2024
Wilson Sonsini Goodrich & Rosati, P.C. (Technical Expert)	11/18	2/19
Orrick, Herrington & Sutcliffe LLP (Technical Expert)	5/18	1/23
DLA Piper LLP (Technical Expert)	10/18	10/23
Metabolic Design Office (IoT consultant)	7/17	12/17
Baker Botts LLP (Technical Expert)	10/17	12/17
Haynes & Boone LLP (Technical Expert)	8/18	1/20
Foley & Lardner LLP (Technical Expert)	10/17	3/20
Morrison & Foerster LLP (Technical Expert)	10/16	present
Gibson, Dunn & Crutcher LLP (Technical Expert)	7/15	5/16
Banner & Witcoff, Ltd (Technical Expert)	8/14	11/14
Weil, Gotshal & Manges LLP (Technical Expert)	7/14	4/16
Moog Music Inc. (organized daylong seminar on research	4/14	4/14

in electronic music at MoogFest 2014)		
Durie Tangri LLP (Technical Expert)	3/14	7/23
Samsung Electronics (Samsung Research Funding & Incubation Center For Future Technology [SRFIC] Expert Reviewer)	2/14	present
Transitio Mexico City (electronic music seminar series)	10/11	10/11
Nokia Research (visiting researcher at NRC Santa Monica)	7/11	8/11
Swedish Foundation for Strategic Research (expert reviewer)	11/10	12/10
Microsoft (visiting researcher at MSR Cambridge UK)	7/10	8/10
Nokia Research Center Activity Review Panel	12/09	12/09
UPF Barcelona (invited week-long seminar series)	4/09	4/09
Microsoft Corp. (Distinguished ALT-TAB for Mobility)	4/08	5/08
Swedish Foundation for Strategic Research (expert reviewer)	3/08	4/08
A.I.E.P. Milano (Seminar series on computer music)	2/07	2/07
Hermann Miller, Inc.	1/05	8/06
Seneca Corporation (Technology Advisory Board)	7/03	7/04
Synectics, Inc.	7/04	7/04
Swedish Foundation for Strategic Research (onsite evaluation)	5/03	5/03
MediaLabEurope, Dublin	6/01	6/02
Diller and Scofidio (architects)	6/00	6/02
University of Limerick (Ireland), External Examiner for Graduate Program in Interactive Media	9/99	9/04
IBM T.J. Watson Research Center	1/99	7/99
British Telecom	4/97	3/99
Fibersense, Inc. (Technology Board Member)	4/97	4/98
Takata Inc., Automotive Systems Laboratory	11/96	12/96
Boston University Photonics Center	11/95	12/95
Optron Systems, Inc.	12/93	4/94
Lyle Mays, Inc.	5/87	12/90
Draper Laboratory	1/78	6/78

11. Department and Institute Committees, Other Assigned Duties

<u>Activity</u>	<u>Beginning</u>	<u>Ending</u>
MIT Faculty Advisory Council to the Vice Provost for Faculty	1/24	1/25
MIT Faculty Leadership panelist, "Managing Teams" Workshop	10/24	10/24
MIT Ignite GenAI Competition, Judge	10/23	10/23
MIT Decarbonization Working Group	9/23	present
MIT Media Lab & College of Computing Faculty Search (cochair)	2/23	6/23
MIT Department Heads Meeting, Special Panel on Engaging with Students	7/21	7/21
MIT New Faculty Orientation Panel, Zoom session on Handling Challenging Meetings with Student Advisees	8/21	8/21
MIT Media Lab Faculty Tenure Committee (chair)	7/21	1/22
MIT Ad Hoc Committee on Graduate Advising and Mentoring	4/21	5/21
MIT LMS Advisory Committee	7/20	10/21
MIT Task Force 2021 – Research Committee	6/20	12/20

MIT New Faculty Orientation Panel (2019)	8/19	8/19
MIT New Faculty Orientation Panel (2018)	9/18	9/18
MIT ESI (Environmental Solutions Initiative)		
Faculty Advisory Committee	10/18	6/25
MIT Media Lab MASCOM-PhD (committee chair)	7/19	9/24
MIT Faculty Leadership Program, Work Design and Personal Productivity Session, Led session on Time Management	5/19	5/19
MIT Committee on Graduate Programs	9/17	9/21
MIT 'Engine' Conflict of Interest Working Group	12/17	12/18
MIT ACT (Art, Culture, Technology) Faculty Search Committee	9/16	7/17
James R. Killian Jr. Faculty Achievement Award		
Selection Committee	7/15	7/17
Selection Committee Chair	7/16	7/17
MIT Creative Arts Council	1/17	1/22
Media Arts and Sciences Search Committee	7/17	7/18
Faculty Advisor, Media Lab Space Exploration Initiative	1/17	present
Undergraduate Advisor	8/14	8/17
MIT Committee for Launch of the Capital Campaign	6/14	6/14
Music and Theater Arts Faculty Search Committee	1/14	7/15
Media Arts and Sciences Faculty Search Committee	11/13	7/14
MIT CUP (Committee on the Undergraduate Program)	9/12	9/15
MIT Committee on Intellectual Property	9/10	9/16
Media Lab IP Commission Member	1/11	9/12
MISTI Global Seed Funds Proposal Evaluator	10/13	present
2012 d'Arbeloff Alumni Class Funds Review Committee	10/12	12/12
Senior faculty search committee for faculty in Built Environments	6/10	9/11
Member, IPCOM (Media Lab Intellectual Property Committee)	7/13	present
Director, IPCOM (Media Lab Intellectual Property Committee)	1/10	7/13
Manager, Media Lab 'HowTo' orientation seminar for new RAs	9/09	1/13
2020 Committee: Vision for Shared Materials Facilities	7/08	7/09
Technology Broadcasting Corporation:		
Board Member	1/06	present
Vice President	7/21	7/23
Horowitz Award Selection Committee (Dept. of Architecture)	5/04	5/06
Media Lab Intellectual Property Committee (IPCOM)	11/02	05/05
MAS Departmental Committee on Graduate Students	8/03	8/04
Deshpande Center Proposal Reviewer	8/03	9/03
Media Arts and Sciences Faculty Search Committee	9/02	6/05
Co-Director, Things That Think Consortium (Media Lab)	7/02	7/16
MAS Departmental Committee on Graduate Students	8/00	8/01
Technology Director, Things That Think Consortium (Media Lab)	1/96	5/01

12. Government and Other Outside Committees, Service, etc.:

<u>Committee</u>	<u>Beginning</u>	<u>Ending</u>
Invited Lecturer, CUSO Winter School 2025 on Human-AI Collaboration, Champéry Switzerland	1/25	1/25
Guest Editor, IEEE Pervasive Computing Magazine, Special Issue on Revisiting Cross Reality	6/24	12/25
Guest Editor, IEEE Pervasive Computing Magazine, Special Issue on The Pervasive Metaverse	1/23	1/24
International Advisory Board, Centre for Interdisciplinary Research in Music Media and Technology (CIRMMT), Montreal	5/23	5/24
Lead Guest Editor, IEEE Pervasive Computing Magazine, Special Issue on Pervasive Computing for Space Applications	1/22	1/23
Scientific Board (Consiglio Scientifico), School for Advanced Studies, University of Macerata (Italy)	5/21	present
Co-Organizer, ACM Space-CHI Workshop	5/21	present
Proposal Evaluator, Austrian Science Fund (FWF)	5/21	5/22
Proposal Evaluator, Leverhulme Trust (UK)	1/21	1/21
Technical Program Committee, IEEE BSN 2021	1/21	6/21
Competition Judge, Copernicus Space Hackathon (Vincenze IT)	2/20	2/20
Faculty Liaison, MIT Reality Hack	1/20	present
Lead Guest Editor, IEEE Pervasive Computing Magazine, Special Issue Managing Attention - Human and Machine Focus in Pervasive Computing	5/19	5/20
Workshop Co-Organizer, 'On-Body Interaction: Embodied Cognition Meets Sensor/Actuator Engineering to Design New Interfaces,' Schloss Dagstuhl (Leibnitz Center for Informatics), Germany	5/18	6/18
Invited Participant, 'Unpacking the Future of IoT', UW Allen School MSR Summer Institute 2017	7/18	8/18
Digital Media & Interaction Research Center, University of Aveiro, Portugal (External Advisory Committee)	1/18	8/24
Advisory Board, EU H2020 VI-DAS Project	11/17	1/19
Invited Participant, 2017 UW CSE/MSR Summer Institute, "Unpacking the Future of IOT"	7/17	8/17
Invited Participant, 'Ambient Notification Environments,' Schloss Dagstuhl (Leibnitz Center for Informatics), Germany	4/17	4/17
The San Diego Zoo, Technology/Sensing Consulting Panel	4/17	4/17
Figure8, Inc. (Technical Advisor)	4/17	present
Co-Chair, IOT 2017 Conference	1/17	12/17
Pro ² Future Austria (Advisory Board)	1/16	present

Guest Editor, IEEE Pervasive Computing (Special Issue on Energy Harvesting and Power Management)	12/15	12/16
Scientific Evaluator, The Hasler Foundation (Switzerland)	12/15	1/16
TPC member: NextMote workshop at EWSN 2016	9/15	1/16
Judge, Guthman Competition, Georgia Tech Music Dept.	2/15	2/15
Strategies In Light Industrial Conference (Advisory Board)	5/15	5/16
Baylor University (External Proposal Reviewer)	4/14	5/14
Appointment Advisory Committee, Faculty of Radiation Science, TU Delft	4/14	5/14
White House Cities, Counties and States Climate Data Workshop	3/14	3/14
World Bank Workshop on Building Climate and Disaster Resilience through Open Data and Innovation	3/14	3/14
AMI'13 (Intl. Conf. on Ambient Intelligence) TPC	6/13	12/13
Habilitation (HRD) Committee, University Pierre et Marie Curie, (CEA) Paris	12/13	12/13
NSF Workshop on Future Directions in Wireless Networking	11/13	11/13
Board of Advisors - Intel Science and Technology Center for Pervasive Computing (ISTC-PC) at U. Washington	5/13	5/16
International Advisory Board, Centre for Interdisciplinary Research in Music Media and Technology (CIRMMT), Montreal	5/13	5/14
Guest Editor, IEEE Pervasive Computing Magazine, Special Issue on Attention Management	1/13	1/14
ESPRC (UK) Proposal Reviewer	12/12	1/13
Scientific Advisory Board for iPack, Swedish Excellence Centre for research and innovation in electronics at KTH	11/12	11/15
Invited Participant, "Interaction Beyond the Desktop," Schloss Dagstuhl (Leibnitz Center for Informatics), Germany	8/12	8/12
NSF Proposal Review Panel	6/12	6/12
NSF Proposal Reviewer	2/12	2/12
European Commission (reviewer for FET projects)	12/11	12/11
Guest Editor, IEEE Pervasive Computing Magazine, Special Issue on Pervasive Interaction	4/11	4/12
NSF Proposal Review Panel	4/11	4/11
Associate TPC Chair for Input Devices Track, CHI 2011	8/10	3/11
Guest Editor, IEEE Pervasive Computing Magazine Special Issue on Automotive Pervasive Computing	7/10	7/11
TEI 2011		
(Intl Conf. on Tangible, Embedded, Embodied Interaction) TPC	6/10	9/10
NIH Workshop on Personal Motion Technologies for	6/10	6/10

Healthy Independent Living		
Texas Higher Education (Committee to evaluate Proposed Ph.D. in Arts and Technology Degree at UTD)	6/10	6/10
WirelessHealth 2010 TPC	4/10	8/10
Guest Editor, IEEE Pervasive Computing Magazine, Special Issue on Smart Energy Systems	1/10	1/11
Swiss National Science Foundation Proposal Reviewer	12/09	1/10
NSF Workshop on Future Directions in Sensing Systems	11/09	11/09
Guest Editor, IEEE Pervasive Computing Magazine, Special Issue on Hostile Environments	10/09	10/10
Associate Editor in Chief, IEEE Pervasive Computing Magazine	4/09	4/15
TPC, BSN (Intl. Conf. on Wearable/Implantable Body Sensor Networks) 2009	1/09	6/09
TPC, ISWC (Wearable Computing Conference) 2009	12/08	9/09
Guest Editor, IEEE Pervasive Computing Magazine Special Issue on Cross-Reality Environments	7/09	7/09
NSF Proposal Review Panel	6/08	6/08
TPC, European Workshop on Sensor Networks (EWSN) '09	5/08	12/08
Guest Editor, IEEE J-SAC Special Issue on BAN (Body Area Networks)	1/08	1/09
IPSN (Intl. Conf. on Information Processing in Sensor Networks) 2008 TPC	8/07	1/08
Guest Editor, IEEE Pervasive Computing Magazine, Special Issue on Hacking in Pervasive Computing	7/07	7/08
BodyNets 2008 TPC	7/07	12/07
NSF-IC Power Sources Workshop	4/07	4/07
Guest Editor, IEEE Pervasive Computing Magazine, Special Issue on Implantable Electronics	7/07	7/08
TPC, ACM MobiEval 2007	2/07	7/07
Editorial Board, ACM/Springer Wireless Networks Journal	2/07	1/09
NSF Workshop on Integrating the Social Sciences into NSF Observatories	1/07	1/07
Co-chair, ISWC 2007 (International Symposium on Wearable Computing)	1/07	10/07
Editorial Board, IEEE Pervasive Computing	9/06	present
Technical Program Committee Co-Chair, The Fourth Workshop on Embedded Networked Sensors (EmNets 2007)	7/06	6/07
Technical Program Committee, Sensor Platform Tools and Design Methods for Networked Embedded Systems (SPOTS),	7/05	5/06

6'th International IEEE Conference on Information Processing in Sensor Networks (IPSN07)		
Technical Program Committee, Second International ACM Conference on Body Area Networks (BodyNets 07)	12/06	6/07
Technical Program Committee, 3'rd IEEE/ACM International Conference On Distributed Computing in Sensor Systems DCOSS'07	10/06	6/07
Technical Program Committee, Fourth International Conference on Networked Sensing Systems (INSS 07)	10/06	6/07
Technical Program Committee, 20'th International Conference on Architecture of Computing Systems (ARCS 2007)	7/06	3/07
Technical Program Committee, 4'th International Workshop on Wearable and Implantable Body Sensor Networks (BSN 2007)	6/06	5/07
Steering Committee, IEEE International Conference on Wearable and Implantable Body Sensor Networks (BSN)	6/06	1/20
Proposal Reviewer, Adventure Fund, Innovative Manufacturing & Construction Research Centre Wolfson School of Mechanical & Manufacturing Engineering, Loughborough University, UK	5/06	6/06
Microelectronics Advisory Council, Fraunhofer Gesellschaft (Germany)	4/06	4/09
Program Committee, (re)Actor: The First International Conference of Digital Live Art	4/06	9/06
Technical Program Committee, ACM Sensys 2006	1/06	9/06
Technical Program Committee, Workshop on World-Sensor-Web (WSW'2006): Mobile Device Centric Sensory Networks and Applications (at ACM Sensys 2006)	1/06	9/06
Singapore Science & Engineering Research Council (SERC) (Proposal Reviewer)	8/05	9/05
Chair, Sensor Platform Tools and Design Methods for Networked Embedded Systems (SPOTS), 5'th International IEEE Conference on Information Processing in Sensor Networks (IPSN06)	7/05	5/06
ERCIM (EU) Beyond-The-Horizon working group on Pervasive Computing & Communications	7/05	12/05
Program Committee, The Fourth International Conference on Pervasive Computing (Pervasive 2006)	7/05	4/06
Co-Chair, IEEE International Workshop on Wearable and Implantable Body Sensor Networks (BSN 2006)	6/05	5/06
Science Foundation Ireland (Proposal Reviewer)	6/05	7/05
External Ph.D. Examiner, National Sensor Center at Dublin City University (DCU)	5/05	6/05

Austrian Science Foundation (Proposal Reviewer)	3/05	4/05
Nokia academic working group on sensor networks	2/05	2/10
Organizing Committee and Technical Program Committee, Sensor Platform Tools and Design Methods for Networked Embedded Systems (SPOTS), 4'th International IEEE Conference on Information Processing in Sensor Networks (IPSN05)	8/04	4/05
Program Committee, International Workshop on Wearable and Implantable Body Sensor Networks (BSN 2005)	4/04	4/05
Program Committee, Workshop on End-to-End, Sense-and-Respond Systems, Applications, and Services (at ACM MobiSys 2005)	12/04	5/05
Program Committee, 2005 IEE Workshop on Intelligent Environments (IE05)	9/04	6/05
Program Committee, 18'th International Conference on Architecture of Computing Systems (ARCS 2005)	7/04	11/04
Program Committee, The Second International Conference on Pervasive Computing (Pervasive 2004)	10/03	5/04
National Research Council Canada (Proposal Reviewer)	1/04	2/04
Science Foundation Ireland (Proposal Reviewer)	2/04	3/04
National Science Foundation, ECE Division (sensors) (Proposal Review Panel in Washington DC)	12/03	12/03
Fonds Québécois de Recherche sur la Société et la Culture, Canada Foundation for Innovation (CFI) (Proposal Review Panel in Montreal)	8/03	8/03
Swedish Foundation for Strategic Research, Visiting Committee Member for 5-year evaluation of all Swedish Interactive Institutes	5/03	6/03
Jury Member, Prix Ars Electronica, Interactive Art Category	3/03	9/03
Guest Editor, <i>IEEE Computer Graphics and Applications</i> Special Issue on SIGGRAPH Emerging Technologies	1/03	1/04
Art Interactive Gallery, Cambridge MA (Arts Advisory Board)	7/02	9/07
Program and Steering Committees, Int. Conference on New Interfaces for Musical Expression (NIME 2003-2006)	7/02	Present
Guest Editor, <i>Journal of New Music Research</i> Special Issue on New Interfaces for Musical Expression	6/02	6/03
Program Committee, The Second International Conference on Ubiquitous Computing (UbiComp 2002)	3/02	6/02
Chief Organizer, First International Conference on New Interfaces for Musical Expression (NIME 2002)	6/01	6/02
Technical Program Committee, ACM/CHI New Interfaces for Musical Expression Workshop	1/01	5/01
Jury, Emerging Technologies program, ACM SIGGRAPH (member of Jury panel 01,02,03)	1/01	6/03

External Examiner, Interactive Media Program, University of Limerick (Ireland) ('99,00,01,02,03,04)	9/99	9/04
Guest Editor, <i>IEEE Computer Graphics and Applications</i> , Special Issue on Input Devices	1/98	6/98
American Institute of Aeronautics and Astronautics (AIAA), Jury for the Columbus 500-year Anniversary Earth-Moon Solar Sail Race	11/89	12/89
Tufts University Radio WMFO – Lead Engineer and Coordinator For Custom Redesign/Rebuild of all Studios	2/85	2/87
Photo Editor, Tufts University 'Jumbo' 1977 Yearbook	7/76	7/77

Paper Reviewer:

See Program Committee memberships and Guest Editorships above. Some of the other conferences and journals that I've reviewed for include:

IMWUT 2021, ISWC 2021, BSN 2019, IEEE Transactions on Sensor Networks, IEEE Sensors Journal, IEEE Transactions on Robotics, IEEE Pervasive Computing, BSN 2006-2013, Pervasive 2012, Pervasive 2006, UbiComp 2014, UbiComp 2010, UbiComp 2009, UbiComp 2008, UbiComp 2006, UbiComp 2005, UbiComp 2004, ACM CHI 2020, ACM CHI 2019, ACM CHI 2017, ACM CHI 2016, ACM UIST 2020, ACM UIST 2019, ACM UIST 2018, UIST 2017, UIST 2015, UIST 2014, UIST 2012, UIST 2011, UIST 2003, UIST 2002, ACM CHI 2016, ACM CHI 2014, CHI 2013, CHI 2011, ACM CHI 2009, ACM CHI 2002, ACM CHI 2000, TEI 2011, SIGGRAPH 2011, SIGGRAPH 2014, IEEE ISWC (International Symposium for Wearable Computers) 1998, NIME 2002-2022, ACC 1994, IEEE/ASME Trans on Mechatronics, Transactions on Neural Systems & Rehabilitation Engineering, ACM Computing Surveys, Heliyon, Communications of the ACM, Computer Music Journal, Journal of New Music Research, IBM Systems Journal, IEEE Information Systems, AIAA Journal of Guidance and Control, IEEE Journal of Neural Networks, Pattern Analysis and Applications Journal, Electronics Letters, IEEE Pervasive Computing, Aerospace Science and Technology, IEEE Computer Graphics & Applications

13. Awards Received:

<u>Award</u>	<u>Date</u>
2023 IEEE Pervasive Computing <i>Best Paper of The Year Award</i>	12/24
2022 Tech Briefs Design Award, <i>Grand Prize</i> [FlowIO Platform]	11/22
2022 Tech Briefs Design Award, Aerospace & Defense Category, <i>First Prize</i> [The Well-Dressed Spacecraft: Electronic Textile Enhanced Thermal Blanket as Debris (and Cosmic Dust) Sensor]	11/22
Best Paper Award, ACM SmartWear '22	10/22

Fast Company's 2022 Innovation by Design Award [3DKnITS wearable e-textile project Finalist (students) and Honorable Mention (experimental)]	10/22
2022 MIDI Association MIDI Innovation Award (Artistic/Visual Project or Installation – Tapis Magique)	5/22
Featured Article Selection, IEEE Transactions on EMB	1/21
AIAA Space Architecture Technical Committee Best Professional Paper Award 2019/2020	1/20
Distinguished Paper Award, Proceedings of the ACM IMWUT (Vol. 2)	9/19
Best Poster Award, NIME 2019	6/19
20-Year Impact Award, ISWC 2018	10/18
Best Paper Award, SIRS 2018	9/18
SXSW Interactive Innovation Award	2/18
Honorable Mention (Best Paper), ISWC 2017	9/17
Best Presentation Award, NIME 2017	5/17
Best Paper Award (Second Prize), Augmented Human 2016	2/16
Best Paper Award, ACM UIST 2016	10/16
Best Presentation Award, ACM Buildsys 2015	11/15
Alexander W. Dreyfoos (1954) Faculty Chair (MIT)	7/15
Honorable Mention (Best Paper) CHI 2015	5/15
Best Session Paper, BSN 2013	6/13
Best Paper Award, CHI 2013	5/13
Best Demo Award (3 rd place) ACM UIST 2012	10/12
IEEE (EMB) Transactions on Information Technology in Biomedicine 2012 Outstanding Paper Award	8/12
Design Contest Winner (ISLPED'08)	8/08
Best Paper Award, ISPN'08 (SPOTS Track)	5/08
Best Presentation Award, ACM Sensys 2007	11/07
Best Paper Award, The 3 rd International Conference on Pervasive Computing (Pervasive 2005)	5/05
Best Paper Award, IPSN'07 (SPOTS Track)	4/07
Best Paper Award, 2003 IEEE International Conference on Sensors (student paper, third prize)	10/03
Sony Career Development Chair (MIT)	9/02
Discover Magazine Award for Technical Innovation (semifinalist, Entertainment category)	6/01
Discover Magazine Award for Technical Innovation (winner, Entertainment category)	6/00

Swets and Zeitlinger Distinguished Paper Award of ICMC 1999 (second prize)	10/99
Draper Laboratory, Recognition Award (for underwater sonar systems)	12/94
Draper Laboratory, Recognition Award (for precision alignment systems in high-energy physics detectors)	7/93
MIT, K.T. Compton Physics Department Fellowship	6/77
Tufts University, BS Summa cum Laude	6/77
Tufts University, Burden Engineering Prize (first prize, undergraduate engineering competition)	6/77
Tufts University, Alumni Award (annually presented to 16 students on basis of grades, activities, etc.)	3/77
Tufts University, Class of 1898 Award (presented to student best displaying competence and capability)	5/76
The 1973 Boston Globe Scholastic Art and Photography Awards (Gold Key Winner, Photography)	3/73
Certificate of Merit Award in Photography, The New York Times	9/72
National Honor Society (Medford High School)	9/72

14. Current Organization Membership:

Organization & Offices Held

ACM (Association for Computing Machinery, SIGCHI and SIGGRAPH)
AIAA (American Institute of Aeronautics and Astronautics – Senior member)
APS (American Physical Society)
IEEE (Senior Member)
IEEE Computer Society
IEEE Control Systems Society
IEEE Signal Processing Society
Sigma Xi
Eta Kappa Nu (Tufts University Chapter President, 1976/77)
Tau Beta Pi

15. Issued Patents and Published or Pending Patent Applications:

- 1) Marrin, T., Paradiso, J.A., Machover, T., Verplaetse, C., and Orth, M., "Apparatus for Controlling Continuous Behavior through Hand and Arm Gestures," U.S. Patent No. 5875257, February 23, 1999.
- 2) Paradiso, J., Hsiao, K., "Multi-axis Tracking of Passive Resonators," U.S. Patent No. 6,404,340, June 11, 2002.
- 3) Knaian, A., Paradiso, J.A., "Wireless Roadway Monitoring System," U.S. Patent 6,662,099, December 9, 2003.
- 4) Maue, W.H., Meinzer, R., Paradiso, J., Feldmeier, M., "Self-Powered Wireless Switch," U.S. Patent No. 6,700,310, March 2, 2004.

- 5) Morrison, G.O., Maue, W.H., Skarb, B.P., Berta, M.J., Meinzer, R., Paradiso, J., Feldmeier, M., Youngs, J., "Self-Powered Wireless Switch," US Patent 6,933,655, August 23, 2005.
- 6) Paradiso, J.A., Ma, H., Lippman, A.B., "Tag Interrogation With Observable Response Signal," US Patent 7,109,865, September 19, 2006.
- 7) Paradiso, J., Lifton, J., Feldmeier, M., Ono, Y., "Platform for Ubiquitous Sensor Deployment in Occupational and Domestic Environments," US Patent Application US20080094210A1, published April 24, 2008.
- 8) Paradiso, J.A., Leo, C-K., Checka, N., "Systems and methods for tracking impacts," US Patent 7,643,015 B2, January 5, 2010.
- 9) Paradiso, J.A., Leo, C-K., Checka, N., "Systems and methods for tracking impacts," US Patent 7,916,128 B2, March 29, 2011.
- 10) Ma, H. and Paradiso, J.A., "Input device based on frustrated total internal reflection," US Patent 7,432,893, October 7, 2008.
- 11) Paradiso, J.A. and Laibowitz, M.J., "Parasitic Mobility in Dynamically Distributed Sensor Networks," US Patent No. 7,429,936, September 30, 2008.
- 12) Lapenta, J.M. and Paradiso, J.A., "Real-time 3-D Localization using Radar and Surface Acoustic Wave Transponders," US Patent 7,924,160, April 12, 2011.
- 13) Paradiso, J.A., Ma, H., Lippman, A.B., "Quasi-passive wakeup function to reduce power consumption of electronic devices," U.S. Patent No. 7,864,051, January 4, 2011.
- 14) Paradiso, J.A., Borque, L.L., "Continuous Capacitive Slider Controller for a Smooth-Surfaced Cooktop," US Patent No. 8,017,890, September 13, 2011.
- 15) Laibowitz, M., Samanta, V., Paradiso, J.A., "Performing a Function," US Patent Application 20130154951-A1, Dec. 15, 2011.
- 16) Feldmeier, M., Paradiso, J. "Personalized Building Comfort Control," US Patent Application No. US20120031984A1, February 9, 2012.
- 17) Paradiso, J.A., Bainbridge, R., "Wireless Hand Gesture Capture," US Patent Application No. US20120139708A1, June 7, 2012.
- 18) Paradiso, J.A. and Ono, Y., "Distributed acoustic conversation shielding system," US Patent No. 8,229,130, July 24, 2012.
- 19) Aldrich, M., Feldmeier, M., Paradiso, J., "Apparatus and methods for interactive illumination," US Patent 8,593,073, Nov. 26, 2013.
- 20) Laibowitz, M., Samanta, V., Paradiso, J.A., "Methods, apparatuses, and computer program products for enabling use of remote devices with pre-defined gestures," U.S. Patent 8,902,180, Dec. 2, 2014.
- 21) Gong, N.-W., Hodges, S.E., Villar, N., and Paradiso, J.A., "Sensing floor for locating people and devices," U.S. Patent 9,077,343, July 7, 2015.
- 22) Zoran, A., Paradiso, J., Shilkrot, R., "Methods and Apparatus for Handheld Tool," US Patent 9,342,632 B2, May 17, 2016.
- 23) Goyal, P. and Paradiso, J., "System for Introspection and Annotation of Electronic Design Data," U.S. Patent No. 9,411,010, August 9, 2019.

- 24) Goyal, P., Zoran, A., Paradiso, J., “Methods and Apparatus for Handheld Inkjet Printer,” U.S. Patent No. 9,446,585, September 20, 2016.
- 25) Paradiso, J., Aldrich, M., Zhao, N., “Methods and Apparatus for Illumination Control,” U.S. Patent No. 9,674,929 B2, June 6, 2017.
- 26) Azaria, A., Mayton, B., and Paradiso, J., “Methods and apparatus for detecting hand-to-mouth compulsive habits,” US Patent No. 10335061, July 6, 2020.
- 27) Zhao, N., Azaria, A., Paradiso, J. “Methods and Apparatus for Multimedia Presentation,” US Patent No. 10,705,706 B2, July 7, 2018.
- 28) Zhao, N., Paradiso, J., “Methods and Apparatus for Image Analysis for Lighting Control,” US Patent No. 10,708,992 B2, July 7, 2020.
- 29) Zhao, N., Paradiso, J., Reches, Y., “Methods and apparatus for producing a multimedia display that includes olfactory stimuli,” US Patent No. 10,706,820 B2, July 7, 2020.
- 30) Ekblaw, A. and Paradiso, J.A., “Methods and Apparatus for Autonomous 3D Self-Assembly, Spatial Docking and Reconfiguration,” US Patent No. 12,110,131 B2, October 8, 2024.
- 31) Paradiso, J.A. and Wicaksono, I., “Three-dimensional machine knitting of electronic textile for activity recognition and biomechanical monitoring,” US Patent No. 12,247,332 B2, March 11, 2025.
- 32) Cherston, J.M. and Paradiso, J.A., “Aerospace Grade Sensing Textile With Sensor Topology,” US Patent Application 18/447,699 filed August 10, 2023.

16. Professional Registration: None

17. Projects

(Public installations, performances or exhibitions – otherwise, my Media Lab research projects are listed at <http://resenv.media.mit.edu/projects/> and detailed in my publications. This list omits many installations that my students have presented based on research that I’ve supervised, as well as installations at conferences (e.g., SIGGRAPH, CHI, etc.) – published descriptions of these are included in my publication list.

- 1) Commissioned concert (funded by MIT CAST) by renowned Grammy-Award-Winning keyboardist Jordan Rudess and my team at MIT, who developed an AI model running in real time and honed on his playing styles for AI-augmented live virtuosic musical performance. *Jordan and the Jam Bot*, <https://news.mit.edu/2024/model-virtuosity-jordan-rudess-jam-bot-1119>, November 19, 2024.
- 2) Custom autonomous synthesizer stream music composition to the *Arts on The Radar Festival* at MIT (and worldwide), September 9, 2022.
- 3) Invited autonomous synthesizer stream music composition to the ETH Pavilion at the *World Economic Forum*, Davos, Switzerland, January 18-25, 2020.
- 4) Invited exhibition and musical installation, MIT Plasma Science and Fusion Center (for the 50th anniversary of MIT CAVS), *reSynthesizer* (see <http://act.mit.edu/projects-and-events/events/events/joe-paradiso-resynthesizer/>), April 27-May 31, 2018.

- 5) Invited exhibition and musical installation, MIT Museum, Cambridge MA, *The Paradiso Synthesizer*, January 12 – April 10, 2012. (see <http://synth.media.mit.edu>)
- 6) Invited installation, Ars Electronica Festival 2011, *DoppelLab and Digital Excavation*, August 31 - September 6, 2011. (see <http://doppelab.media.mit.edu>)
- 7) Invited installation at Ars Electronica 2009 (with students Alex Reben, Matt Laibowitz, Nan-Wei Gong), *Ubiquitous Sensor Network Navigator*, September 3-8, 2009. (see <http://www.aec.at/humannature/mit-medialab/ubiquitous-sensor-network-navigator>)
- 8) Invited exhibition and performance of my homemade modular music synthesizer at the 25'th anniversary Ars Electronica Festival, *Timeshift*, Linz, Austria, September 3-7, 2004; also presented an invited artists' seminar on history and design of modular synthesizers. (see <http://web.media.mit.edu/~joep/synthars.html>)
- 9) Invited installation of the *Interactive Window* impact tracker at the Innovation Corner, Motorola iDEN facility, Plantation, Florida, October 30, 2003 – 2006. (see <http://resenv.media.mit.edu/Tapper/Motorola.html>)
- 10) Exhibition at the Artbots Robotic Talent Show in New York City: *Tribblation* (a sphere tiled by a reactive sensor net skin), with student Josh Lifton, July 12-13, 2003. (see <http://resenv.media.mit.edu/tribble/>)
- 11) Exhibition of the *Magic Carpet* installation at the MIT Museum as *Stomping Ground*, February 28, 2002 – April 5, 2004. (see <http://web.media.mit.edu/~joep/SpectrumWeb/captions/Carpet.html>)
- 12) Installation of interactive window in collaboration with American Greetings at their flagship card store at Rockefeller Center in New York City, Dec. 9, 2001- Feb. 18, 2002. (see <http://resenv.media.mit.edu/Tapper/AmGreet.html>)
- 13) Exhibition of window tap-tracking interface at the Kitchen Gallery in New York City in *Telephone Story* as part of the *ID/Entity Exhibition*, Nov. 30, 2001- Jan. 15, 2002. (see <http://resenv.media.mit.edu/Tapper/IdEntity.html>)
- 14) Invited exhibition of *Interactive Window* System at the Ars Electronica Center, Linz Austria, September 1, 2001 - September 1, 2004. (see <http://resenv.media.mit.edu/Tapper/ResWindow.html>)
- 15) Invited installation, *Atmospheres*, (in collaboration with Prof. John Maeda) at the *Workspheres* Exhibition, Museum of Modern Art (MOMA), New York, February 7 through April 22, 2001. (see <http://resenv.media.mit.edu/atmo/index.html>)
- 16) Invited installation of *Magic Carpet* musical installation at the Current Science and Technology Center, Boston Museum of Science, February 1 through April 20, 2001. (see <http://web.media.mit.edu/~joep/SpectrumWeb/captions/Carpet.html>)
- 17) Invited installation of *Musical Trinkets* at the SMAU Convention, Milan Italy, October 19-23, 2000. (see <http://resenv.media.mit.edu/sweptRF.html>).
- 18) Invited photographic exhibition, Wessell Library, Tufts University, 1974.

(Completed Musical Recordings composed by me – all performed using my custom-built and self-designed electronic music equipment and recorded either in my studio or live at public

installations – see <http://paradiso.media.mit.edu/synth.html> . Content is also streamed and posted off @ParadisoModular on YouTube)

- 1) **Patchwork**, July 1, 2000
<https://joeparadiso.bandcamp.com/album/patchwork>.
- 2) **State Machine Music**, January 1, 2002
<https://joeparadiso.bandcamp.com/album/state-machine-music>.
- 3) **Timeshift - Live at Ars Electronica 2004**, September 30, 2004
<https://joeparadiso.bandcamp.com/album/timeshift-live-at-ars-electronica-2004>.
- 4) **Synth Dystopia**, March 20, 2020
<https://joeparadiso.bandcamp.com/album/synth-dystopia>.
- 5) **Synth Utopia, Vol. 1**, March 7, 2021
<https://joeparadiso.bandcamp.com/album/synth-utopia-vol-1>.
- 6) **Nebulosity**, April 1, 2021
<https://joeparadiso.bandcamp.com/album/nebulosity>.
- 7) **Synth Utopia, Vol. 2**, April 3, 2021.
<https://joeparadiso.bandcamp.com/album/synth-utopia-vol-2>.
- 8) **My Tangled Roots**, July 14, 2022.
<https://joeparadiso.bandcamp.com/album/my-tangled-roots>.

I have been producing and airing programs for Boston-area college radio featuring progressive/avant-garde rock and jazz, 20th century classical music, and experimental/electronic compositions since 1973, including hosting occasional interviews and live performances. I started at WMFO (Tufts University), and produced many programs there from 1973-1987 (I also served a few years as Production Director and led a team that redesigned/rebuilt this radio station between 1985-1987). I also did many programs at MIT's radio station WMBR, including "Camembert Electrique" (1978), "The Asylum" (guesting on shows 1978-1983), "Difficult Listening Hour" (1984-1985) and "Electronic Countermeasures" (1986-1994). I still do occasional guest shows at WMBR and WZBC (Boston College, one of the USA's most influential experimental music stations) and serve as an officer in WMBR's governing body, the Technology Broadcast Corporation.

18. Symposia Organized:

(External academic workshops or conferences – in addition, I have organized several themed symposia with invited speakers for Media Lab consortia meetings, which I am omitting here)

Workshop Co-Organizer, SpaceCHI (CHI 2021, CHI 2022, and MIT 2023), May 14, 2021, May 1, 2022, and June 22-23, 2023.

Workshop Co-Organizer, On-Body Interaction: Embodied Cognition Meets Sensor/Actuator Engineering to Design New Interfaces, Schloss Dagstuhl (Leibnitz Center for Informatics), Germany, May 22-24, 2018.

Conference Co-Chair, IOT 2017, Linz Austria, October 22-25, 2017.

Local Chair, IEEE International Workshop on Wearable and Implantable Body Sensor Networks (BSN 2015), Cambridge MA, June 9-12, 2015.

Local Chair, IEEE International Workshop on Wearable and Implantable Body Sensor Networks (BSN 2013), Cambridge MA, May 6-9, 2013.

Co-chair, ISWC 2007 (International Symposium on Wearable Computing), Boston MA, Oct. 11-13, 2007.

Technical Program Committee Co-Chair, The Fourth Workshop on Embedded Networked Sensors (EmNets 2007), Cork Ireland, June 25-26, 2007

Chair, Sensor Platform Tools and Design Methods for Networked Embedded Systems (SPOTS), 5'th International IEEE Conference on Information Processing in Sensor Networks (IPSN06), Nashville TN, April 19-21, 2006.

Co-Chair, IEEE International Workshop on Wearable and Implantable Body Sensor Networks (BSN 2006), Cambridge MA, April 3-5, 2006.

Chief Organizer, First International Conference on New Interfaces for Musical Expression (NIME 2002), Dublin Ireland, May 24-26, 2002.

19. Teaching Experience of Joseph A. Paradiso:

As Course founder/lecturer or co-founder/co-lecturer or sole instructor or supervising faculty:

<u>Term</u>	<u>Sub. No.</u>	<u>Title</u>	<u>Role</u>	<u>Enrollment</u>
ST24	MAS.837	Principles of Electronic Music Interfaces	Instructor	10
FT23	MAS.921	Proseminar in Media Arts & Sciences	Instructor	25
FT23	MAS.S90	Introduction to Media Arts & Sciences	Supervising Faculty	20
FT23	MAS.838	Designing & Deploying Projects for Zero Gravity Flights	Co-Instructor	15
ST 23	MAS.S61	The Metaverse: What, How, Why and When (although only 4 took it for credit, up to 150 attended lectures)	Chief Instructor	4
FT22	MAS.921	Proseminar in Media Arts & Sciences	Instructor	20
FT22	MAS.S90	Introduction to Media Arts & Sciences	Supervising Faculty	20
ST22	MAS.836	Sensor Technology for Interactive Environments	Instructor	20

FT21	MAS.921	Proseminar in Media Arts & Sciences	Instructor	25
FT21	MAS.838	Designing & Deploying Projects for Zero Gravity Flights	Supervising Faculty	10
FT21	MAS.S90	Introduction to Media Arts & Sciences	Supervising Faculty	15
ST 21	MAS.S76	Adventures in Sensing (although only 2 took it for credit, up to 100 attended lectures)	Instructor	2
FT20	MAS.921	Proseminar in Media Arts & Sciences	Instructor	25
FT20	MAS.S66	Designing & Deploying Projects for Zero Gravity Flights	Supervising Faculty	10
FT20	MAS.S90	Introduction to Media Arts & Sciences	Supervising Faculty	15
FT19	MAS.S63	Designing & Deploying Projects for Zero Gravity Flights	Supervising Faculty	5
FT19	MAS.921	Proseminar in Media Arts & Sciences	Instructor	25
ST19	MAS.836	Sensor Technology for Interactive Environments	Instructor	20
FT18	MAS.921	Proseminar in Media Arts & Sciences	Instructor	25
FT18	MAS.S64	Designing & Deploying Projects for Zero Gravity Flights	Supervising Faculty	10
IAP18		An Introduction to Prog Rock	Instructor	20
FT17	MAS.921	Proseminar in Media Arts & Sciences	Co-Instructor	25
ST17	MAS.836	Sensor Technology for Interactive Environments	Instructor	20
FT16	MAS.S60	Sci Fab 2050 SF-Inspired Envisioneering & Futurecasting	Supervising Faculty	10
FT16	MAS.S68	Here, There and Everywhere: The Future of Music in Sound, Space, and Place	Co-Instructor	20
FT16	MAS.500	Hands on Foundations in Media Technology	Chief Instructor	20
ST16	MAS.836	Sensor Technologies for Interactive Environments	Instructor	20
FT15	MAS.837	Principles of Electronic Music Interfaces	Instructor	10

FT15	MAS.500	Hands on Foundations in Media Technology	Chief Instructor	20
ST15	MAS.836	Sensor Technologies for Interactive Environments	Instructor	15
FT14	MAS.S62	New Paradigms in Musical Instruments	Co-Instructor	10
FT14	MAS.500	Hands on Foundations in Media Technology	Chief Instructor	20
ST14	MAS.S63	Silicon Menagerie: From Bioinspiration to Biomimetics	Co-Instructor	13
ST14	MAS.500	Hands on Foundations in Media Technology	Chief Instructor	20
FT13	4.523	Second Nature: Design of Low-Power Environmental Sensors & Networks	Co-Instructor	10
FT13	MAS.500	Hands on Foundations in Media Technology	Chief Instructor	20
ST13	MAS.826	Future of Festivals	Co-Instructor	15
FT12	MAS.837	Principles of Electronic Music Interfaces	Instructor	10
ST12	MAS.836	Sensor Technologies for Interactive Environments	Instructor	20
FT11	MAS.S61	Emerging Technologies in Location-Aware Computing	Instructor	10
ST11	MAS.836	Sensor Technologies for Interactive Environments	Instructor	20
FT10	MAS.837	Principles of Electronic Music Interfaces	Instructor	10
ST10	MAS.836	Sensor Technologies for Interactive Environments	Instructor	20
ST09	MAS.969	Building Cross-Reality Applications	Instructor	7
FT08	MAS.837	Principles of Electronic Music Interfaces	Instructor	10
ST08	MAS.836	Sensor Technologies for Interactive Environments	Instructor	20
ST07	MAS.836	Sensor Technologies for Interactive Environments	Instructor	20
FT06	MAS.960	Principles of Electronic Music Controllers	Instructor	10
ST06	MAS.836	Sensor Technologies for Interactive Environments	Instructor	20

FT05	MAS.961	Developing Applications for Sensor Networks	Instructor	12
ST05	MAS.836	Sensor Technologies for Interactive Environments	Instructor	20
FT04	MAS.863	How to Make (Almost) Anything	Co-Instructor	16
ST04	MAS.836	Sensor Technologies for Interactive Environments	Instructor	16
FT03	MAS.863	How to Make (Almost) Anything	Co-Instructor	16
ST03	MAS.965	Electronic Skins and Dense Sensor Networks	Instructor	15
FT02	MAS.963	Principles of Electronic Music Controllers	Instructor	10
FT02	MAS.863	How to Make (Almost) Anything	Co-Instructor	16
FT01	MAS.863	How to Make (Almost) Anything	Co-Instructor	16
ST01	MAS.967	Sensor Technologies for Interactive Environments	Instructor	17
FT00	MAS.863	How to Make (Almost) Anything	Co-Instructor	16
FT99	MAS.863	How to Make (Almost) Anything	Co-Instructor	16
FT98	MAS.863	How to Make (Almost) Anything	Co-Instructor	16
ST83	VP (ETHZ)	Praktikum für Vorgerückte (Junior Physics Lab)	Instructor	10

As Guest Lecturer:

FT24	2.177/2.178	Designing Virtual Worlds	Guest Lecturer	25
ST24	4.s42	Decarbonizing the MIT Campus	Guest Lecturer	19
FT22	4.183	Architectural Design Workshop: The Big Zero (Energy Harvesting)	Guest Lecturer	12
ST22	ASP XVII Alta Scuola Politecnica, Milano	L.A.D.E.: Lunar Architecture Design Exploration	External Tutor	10
FT21	4.154/4.S01	Fashion, Design & Technology: Intelligent Skin	Guest Lecturer	15
FT21	MAS.825J	Reimagining Hyperinstruments: Musical Aesthetics and Media Technology	Guest Lecturer	15
FT21	056141 Politecnico di Milano	Design Exploration: Towards a Moon Architecture	Guest Lecturer & Faculty Advisor	115
FT20	056141 Politecnico di Milano	Architecture for Human Space Exploration	Guest Lecturer	90

ST20	18-745	Rapid Prototyping of Computer Systems (CMU)	External Final Project Evaluator	20
FT18	6.UAR	SuperUROP Seminar	Guest Lecturer	150
ST14	4.373	Sound installations + sonic interventions	Project Jury	10
ST13	15.356	How to Develop Breakthrough Products and Services	Guest Lecturer	30
ST12	15.356	How to Develop Breakthrough Products and Services	Guest Lecturer	30
ST12	4.333	(in)dependent people: advanced seminar in networked cultures and participatory media	Guest Lecturer	10
ST11	15.356	How to Develop Breakthrough Products and Services	Guest Lecturer	30
FT11	MPATE-GE-2038	Creating with Interactive Media: Buchla to Ableton (NYU)	Guest Lecturer	15
FT11	MAS.825J	ARTS@MEDIA LAB	Guest Lecturer	20
ST10	15.356	How to Develop Breakthrough Products and Services	Guest Lecturer	30
ST09	15.356	How to Develop Breakthrough Products and Services	Guest Lecturer	30
ST08	15.356	How to Develop Breakthrough Products and Services	Guest Lecturer	30
ST08	CSIM	5 guest lectures on ‘Advanced Interface Design’ at the Universitat Pompeu Fabra (UPF) in Barcelona	Guest Lecturer	29
FT07	MAS.825J	Musical Aesthetics and Media Technology	Guest Lecturer	15
ST06	15.356	Development of Concepts for Very Novel Products and Services	Guest Lecturer	30
ST06	MAS.960	Digital Innovations	Guest Lecturer	25
ST06	CMS.876	History of Media and Technology	Guest Lecturer	15
ST05	15.356	Development of Concepts for Very Novel Products and Services	Guest Lecturer	30
ST05	591b	Active Materials (Yale Architecture Dept.)	Guest Lecturer	10
FT04	MAS.965	Deep Engagement	Guest Lecturer	10
ST04	6.ThT	Preparation for Masters of Engineering Thesis	Guest Lecturer	15
ST04	MAS.968	Concept Car	Guest Lecturer	7

ST04	MAS.963	Ambient Intelligence	Guest Lecturer	15
ST04	15.356	Development of Concepts for Very Novel Products and Services	Guest Lecturer	30
FT03	1.961	Sensor Based Monitoring of Physical Infrastructure and the Environment	Guest Lecturer	10
ST03	15.356	Development of Concepts for Very Novel Products and Services	Guest Lecturer	30
FT02	6.191	Prototyping Research Results	Guest Lecturer	15
ST02	15.356	Development of Concepts for Very Novel Products and Services	Guest Lecturer	30
FT01	6.191	Prototyping Research Results	Guest Lecturer	10
ST01	Music 250A	Human Computer Interaction Theory and Practice: Designing New Devices (Stanford University)	Guest Lecturer	20
ST01	15.356	Development of Concepts for Very Novel Products and Services	Guest Lecturer	30
ST01	4.259J	Urban Narratives: Making the City Speak	Guest Lecturer	15
ST00	15.356	Development of Concepts for Very Novel Products and Services	Guest Lecturer	30
ST00	MS-335	Advanced Modular Synthesis (Berklee School of Music)	Guest Lecturer	10
FT99	6.191	Prototyping Research Results	Guest Lecturer	10
ST98	SEM.DL2	Scientific & Engineering Problems...	Guest Lecturer	10
FT97	MAS.962	Interacting w. Synthetic Characters	Guest Lecturer	20
FT97	MAS.846	Workshop in Elastic Movie Time	Guest Lecturer	20
FT97	MAS.825J	Musical Aesthetics & Media Tech.	Guest Lecturer	20
ST97	SEM.DL2	Scientific & Engineering Problems...	Guest Lecturer	10
ST96	SEM.DL2	Scientific & Engineering Problems...	Guest Lecturer	10
ST95	SEM.DL2	Scientific & Engineering Problems...	Guest Lecturer	10
ST94	SEM.DL2	Scientific & Engineering Problems...	Guest Lecturer	10
ST92	SEM.DL2	Scientific & Engineering Problems...	Guest Lecturer	10

Note – Enrollment numbers are estimated from memory, generally accurate to within 20%

20. Publications of Joseph A. Paradiso (Google Scholar h-index 73):

a. Papers in Refereed Journals:

- 1) * Chwalek, P., Kuronaga, M., Zhu, I., Montague, S., Robinson V.C., Lohrmann, J., Gil, C.A.V., Susič, D., Gradišek, A., Schul, J., Paradiso, J.A., Arbetman, M., “High-Res Acoustic and Environmental Data to Monitor *Bombus Dahlbomii* Amid Invasive Species, Habitat Loss,” *Nature Scientific Data*, Vol. 12, No. 1, April 2025.
- 2) *Zhong, S., Chwalek, P., Perry, N., Ramsay, D., Miller, C., Lalanne, D., Alavi, H.S., Paradiso, J.A., “Sensors and Sensibilities: Exploring Interactions for Habitat Comfort with an Environmental-Physiological Sensing Eyewear in the Wild,” *International Journal of Human-Computer Studies*, Volume 200, April, 2025, pg. 103510.
- 3) Röddiger, T., Küttner, M., Lepold, P., King, T., Moschina, D., Bagge, O., Paradiso, J.A., Clarke, C., Beigl, M., “OpenEarable 2.0: Open-Source Earphone Platform for Physiological Ear Sensing,” in *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*, Vol. 9, No. 1, April, 2025, pp. 1-33.
- 4) Chwalek, P., Coblenz, M., Montague, S., Kuronaga, M., Zhu, I., Paradiso, J.A., “Acoustic data collection in arctic environments during the midnight sun using multi-channel SoundSHROOMs,” *Nature Scientific Data*, Vol. 12, No. 1, February 2025.
- 5) Chwalek, P., Zhong, S., Perry, N., Liu, T., Miller, C., Alavi, H.S., Lalanne, D., Paradiso, J.A., “A dataset exploring urban comfort through novel wearables and environmental surveys,” *Nature Scientific Data*, Vol. 11, No. 1, Article No. 1423, December 2024.
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- 7) Wicaksono, I., Tianhong, C.Y, Cheng, T. Danieleescu, A., Zhang, C., Mueller, S., Paradiso, J., Luo, Y., "Design and Fabrication of Multifunctional E-Textiles by Upcycling Waste Cotton Fabrics through Carbonization," *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*, 8(2), June, 2024, Article 45, pp. 1-31.
- 8) *Ekblaw, A., Cherston, J., Liu, F., Wicaksono, I., Haddad, D.D., Sumini, V., and Paradiso, J.A., “From UbiComp to Universe—Moving Pervasive Computing Research Into Space Applications,” *IEEE Pervasive Computing*, Vol. 22, No. 2, April-June, 2023, pp. 27-42.
2023 IEEE Pervasive Computing Best Paper of The Year Award
- 9) *Najjar, D., Rainbow, J., Timilsina, S. S., Jolly, P., de Puig, H., Yafia, M., Durr, N., Sallum H., Alter, G., Li, J.Z., Xu, G.Y., Walt, D.R., Paradiso, J.A., Estrela, P., Collins, J.J., Ingber, D.E., Lab-on-a-chip multiplexed electrochemical sensor enables simultaneous detection of SARS-CoV-2 RNA and host antibodies,” *Nature Biomedical Engineering*, 6(8), August 2022, pp. 968-978.

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- 10) *Zhao, N., Kodama, E.C., Paradiso, J.A., “Mediated Atmosphere Table (MAT): Adaptive Multimodal Media System for Stress Restoration,” *IEEE Internet of Things Journal*, Vol. 9, No. 23, July 2022, pp. 23614-23625.
- 11) *Chwalek, P., Ramsay, D., Paradiso, J.A., “Captivates: A Smart Eyeglass Platform for Across-Context Physiological Measurement,” *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*, Vol. 5, No. 3, Article No. 93, September 2021, pp. 1-32. **Distinguished Paper Award**
- 12) *Wicaksono, I., Cherston, J., and Paradiso, J.A., “Electronic Textile Gaia: Ubiquitous Computational Substrates Across Geometric Scales,” *IEEE Pervasive Computing*, Vol. 20, No. 3, July-Sept. 2021, pp. 18-29.
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- 14) Rojas, C., Poulsen, N., Van Tuyl, M., Vargas, D., Cohen, Z., Paradiso, J., Maes, P., Esvelt, K., and Adib, F., “A Scalable Solution for Signaling Face Touches to Reduce the Spread of Surface-Based Pathogens,” *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*, Vol. 5, No. 1, Article No. 31, March 2021, pp. 1-22.
- 15) *Zhao, N., Seiting, S., Richer, R., Paradiso, J.A., “Real-time work environment optimization using multimodal media and body sensor network,” *Smart Health*, Vol. 19, March 2021, pp. 1-19.
- 16) *Ananthabhotla, I., Ramsay, D.B., Duhart, C., Paradiso, J.A., “Cognitive Audio Interfaces: Mediating Sonic Information With an Understanding of How We Hear,” *IEEE Pervasive Computing*, Vol. 20, No. 2, February 2021, pp. 36-45.
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- 18) *Ramsay, D.B. and Paradiso, J.A., “The LearnAir Network: Leveraging Sensor Heterogeneity to Improve Air Quality Estimation for the Semantic Web,” in *IEEE Pervasive Computing*, Vol. 18, No. 3, July-September, 2019, pp. 9-20.
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- 20) *Lapinski M., Brum Medeiros C., Moxley Scarborough D., Berkson E., Gill T.J., Kepple T., Paradiso J.A.,” A Wide-Range, Wireless Wearable Inertial Motion Sensing System for

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- Capturing Fast Athletic Biomechanics in Overhead Pitching,” *Sensors* (Basel), 19(17), Aug 21, 2019.
- 21) *Ou, J., Oran, D., Haddad, D.D., Paradiso, J., and Ishii, H., “SensorKnit: Architecting Textile Sensors with Machine Knitting,” *3D Printing and Additive Manufacturing*, Vol. 6, No. 1, February 2019, pp. 1-11.
- 22) *Zhao, N., Reinhart, C.F., Paradiso, J.A., “Image-Based Perceptual Analysis of Lit Environments,” *Lighting Research & Technology*, 51(5), 704-724, 2018.
- 23) *Ananthabhotla, I. and Paradiso, J.A., "SoundSignaling: Realtime, Stylistic Modification of a Personal Music Corpus for Information Delivery", in *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)*, December 2018.
- 24) *Dementyev, A., Hernandez, J., Choi, I., Follmer, S., Paradiso, J., “Epidermal Robots: Wearable Sensors That Climb on The Skin,” in *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)*, Vol. 4, No. 3, Sept. 2018, pp. 102:1-102:21. **Distinguished Paper Award, Proceedings of the ACM IMWUT (Vol. 2)**
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- 52) Paradiso, J.A., Gershenfeld, N., "Musical Applications of Electric Field Sensing," *Computer Music Journal*, Vol. 21, No. 3, Summer 1997, pp. 69-89.
- 53) Paradiso, J.A., "New Technologies for Monitoring the Precision Alignment of Large Detector Systems," *Nuclear Instruments and Methods in Physics Research A*386, 1997, pp. 409-420.
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b. Papers in Refereed Conference Proceedings:

- 1) *Meyer, S., Levin, D.V., Haddaad, D.D., Wicaksono, I., and Paradiso, J.A., “Design, Control, and Testing of Intelligent Electromagnetic Footwear for Astronautical Applications,” to appear in the Proc. of the 54th Int. Conf. on Environmental Systems (ICES), July 13-17, Prague, Czech Republic, 2015 (Paper 242).
- 2) Blanchard, L., Holt, C., and Paradiso, J.A., “AI Harmonizer: Expanding Vocal Expression with a Generative Neurosymbolic Music AI System,” to appear in the Proceedings of the International Conference on New Interfaces for Musical Expression (NIME2025), Canberra, Australia, June 24-27, 2025.
- 3) Liu, F., Blanchard, L., Haddad, D.D., and Paradiso, J.A., “Two Sonification Methods for the MindCube,” to appear in the Proceedings of the International Conference on New Interfaces for Musical Expression (NIME2025), Canberra, Australia, June 24-27, 2025.
- 4) Röddiger, T., Zitz, V., Hummel, J., Küttner, M., Lepold, P., King, T., Paradiso, J.A., Clarke, C., Beigl, M., “Demonstrating OpenEarable 2.0: An AI-Powered Ear Sensing Platform,” in the Proceedings of the Extended Abstracts of the CHI Conference on Human Factors in Computing Systems, Article No. 713, April 25, 2025, pp. 1-4.
- 5) *Chin, S., Fang, C.M., Singh, N., Ibrahim, I., Paradiso, J., Maes, P., “Purrfect Pitch: Exploring Musical Interval Learning through Multisensory Interfaces,” in the Proc. of the Augmented Humans 2025 Conference, Abu Dhabi, March 16-20, 2025.
- 6) *Liu, F. Perry, N., Ekblaw, A., Paradiso, J.A., “A Field Expedition and Parabolic Flight Experiment for the HexSense: A Type of Ballistic Deployed Self-Oriented Wireless Sensor Nodes for Future Lunar Exploration,” in Proc. of the AIAA SciTech 2025 Forum, 6-10 January 2025, Orlando FL., Paper AIAA 2025-1670.
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- 10) Liu, F., Haddad, D.D., and Paradiso, J., “MindCube: an Interactive Device for Gauging Emotions,” in the Adjunct Proceedings of the 37th Annual ACM Symposium on User Interface Software and Technology, UIST 2024, Article No. 30, October 2024, pp. 1-2.

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- 11) Honnet, C., Yu, T.C., Wicaksono, I., Cheng, T., Danieleescu, A., Zhang, C., Mueller, S., Paradiso, J. and Luo, Y., "Democratizing Intelligent Soft Wearables," Adjunct Proceedings of the 37th Annual ACM Symposium on User Interface Software and Technology (UIST 2024).
- 12) *Wicaksono, I., Blanchard, L., Chin, S., Colon, C., and Paradiso, J., "KnitworkVR: Dual-reality Experience through Distributed Sensor-Actuator Networks in the Living Knitwork Pavilion," SIGGRAPH Asia 2024 Art Papers (pp. 1-7).
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- 14) *Liu, F., Cahoy, K., Ekblaw, A., and Paradiso, J.A., "A Wireless Lunar Sensor Node Powered by Temperature Gradients across the Device's Surface," in the Proc. of the 2024 IEEE Aerospace Conference, Big Sky, Montana, March 2-9, 2024.
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- 17) *Chwalek, P., Zhong, S., Ramsay, D., Perry, N., and Paradiso, J., "AirSpec: A Smart Glasses Platform, Tailored for Research in the Built Environment," in the Adjunct Proceedings of the 2023 ACM Conference on Pervasive and Ubiquitous Computing and Int. Symposium on Wearable Computing, Cancun Mexico, October 8-12, 2023, p. 204.
- 18) *Wicaksono, I., Shtarbanov, A., Slater, R., Ranade, E., and Paradiso, J., "Peristaltic (PS) Suit: Active Bioelectronic Sensing-Compression Spacesuit for Microgravity Adaptation and Cardiovascular Deconditioning," in the *Proc. of AIAA ASCEND 2022*, Las Vegas, NV, October 24-26, 2022, Paper AIAA 2022-4208.
- 19) *Wicaksono, I., Shtarbanov, A., Ranade, E., Slater, R., Newman, D., Paradiso, J., "Design, Development, and Testing of Peristaltic Suit: Active-Dynamic Compression and Physiological Sensing Intra-Vehicular Activity Spacesuit for Cardiovascular Deconditioning," in *Proc. of the 52'nd International Conference on Environmental Systems*," Calgary CA, July 16-20, 2023, Paper ICES-2023-157.
- 20) Sumini, V., Chesi, C., Florenzano, D., Botti, M., Calogero, L., Corrêa, C., Caruso, A., Comparini, M.C., Ferrone, E., Hoffman, J., Maggiore, P., Mattioli, M., Paradiso, J., Perino, M.A., Portolani, M., Rizzo, A., and Signorotto, G., "A Mobile Habitat for Human Lunar

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Exploration,” in the *Proc. of the Italian Workshop on Shell and Spatial Structures (IWSS 2023)*, Springer Lecture Notes in Civil Engineering, Vol 437, June 2023, pp. 784-790.

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Best Paper Award

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- 23) *Liu, F. Ekblaw, A., and Paradiso, J.A., “LunarWSN node - a Wireless Sensor Network node designed for In-Situ lunar water ice detection,” in *Proc. of the 36th Annual Small Satellite Conference (SmallSat 2022)*, Logan UT, August 6-11, 2022, Paper SSC22-WKP2-21.
- 24) *Wicaksono, I., Hwang, P.G., Droubi, S., Xi Wu, F., Serio, A.N., Yan, W., and Paradiso, J.A., “3DKnITS: Three-dimensional digital knitting of intelligent textile sensor for activity recognition and biomechanical monitoring,” in *Proc. of the 44th Annual Int. Conf. of the IEEE Engineering in Medicine & Biology Society (EMBC)*, Glasgow UK, July 11-15, 2022, pp. 2403-2409.
- 25) *Ramsay, D. and Paradiso, J., “Peripheral Light Cues as a Naturalistic Measure of Focus,” *ACM International Conference on Interactive Media Experiences (IMX'22)*, Aveiro, Portugal, June 22-24, 2022, pp. 375-380.
- 26) *Wicaksono, I., Haddad, D.D., Paradiso, J., “Tapis Magique: Machine-knitted Electronic Textile Carpet for Interactive Choreomusical Performance and Immersive Environments,” in *Proc. of the 14th Conf. on Creativity and Cognition (C&C '22)*, Venice, Italy, June 20-23, 2022, pp. 262-274.
- 27) Payra, S. and Paradiso, J.A., “Artemis Removable-Canister Waste Accumulation System & Handler (ARC-WASH): A Portable Modular Space Lavatory,” in *Proc. of the 2022 IEEE Aerospace Conference*, Big Sky, MT, March 5 - 12, 2022, pp. 1-12.
- 28) *Ananthabhotla, I., Ramsay, D., and Paradiso, J.A., "Towards Gestalt Computation in Sound," *NeurIPS 2021 Workshop on Machine Learning for Creativity and Design*, Dec. 13-14, 2021.
- 29) *Boger, T., Ananthabhotla, A., and Paradiso, J., “Manipulating causal uncertainty in sound objects,” in *Proc. of Audio Mostly 2021 (AM 21)*, September 2021, pp. 9-15.
- 30) *Ekblaw, A., Zuniga, D., Crooker, K., and Paradiso, J., “Self-Assembling and Self-Regulating Space Stations: Mission Concepts for Modular, Autonomous Habitats,” in *Proc.*

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- 31) *Venkatapathy, A.K.R., ten Hompel, M., and Paradiso, J., “Decentralized Brains: A Reference Implementation with Performance Evaluation,” in *Proc. of Industrial IoT 2020*, Springer LNICST Vol. 365, March 2021.
- 32) *Payra, S., Wicaksono, I., Cherston, J., Honnet, C., Sumini, V., and Paradiso, J.A., “Feeling Through Spacesuits: Application of Space-Resilient E-Textiles to Enable Haptic Feedback on Pressurized Extravehicular Suits,” in the *2021 IEEE Aerospace Conference* (50100), 6-13 March 2021, pp. 1-12.
- 33) Sumini, V., Esfandabadi, M.M., Paradiso, J., and Trotti, G., “Structural Insight of Persian Bathhouse Architecture for Designing Greenhouses on Mars,” in *Proc. of the 17th Biennial International Conference on Engineering, Science, Construction, and Operations in Challenging Environments* (Earth and Space 2021), pp. 1279-1309.
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- 36) *Kodama, E.C., Zhao, N. and Paradiso, J.A., “LightCloud: Future of Dynamic Lighting in the Shared Space,” in *Proc. of the Future Technologies Conference (FTC 2020)*, Vol. 3, Springer Advances in Intelligent Systems and Computing 1290, October 2020, pp. 1008-1017.
- 37) *Wicaksono, I. and Paradiso, J.A., “KnittedKeyboard: Digital Knitting of Electronic Textile Musical Controllers,” in *Proc. of NIME 2020*, Birmingham, UK, July 21-25, 2020.
- 38) *Wilbert, J., Haddad, D.D., Ishii, H., and Paradiso, J.A., “Patch-corde: an expressive patch cable for the modular synthesizer,” in *Proc. of New Interfaces for Musical Expression 2020 (NIME20)*, Royal Birmingham Conservatoire, UK, July 21-25, 2020.
- 39) *Ananthabhotla, I., Ewert, S., and Paradiso, J.A., “Using a Neural Network Codec Approximation Loss to Improve Source Separation Performance in Limited Capacity Networks,” in *Proc. of the 2020 International Joint Conference on Neural Networks (IJCNN)*, Budapest, Hungary, July 14-19, 2020.
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- 41) Zeng, J., Kodama, E., DeLaTorre, L.B., Wood, D., and Paradiso, J., “Design and Fabrication of a Crawling Origami Robot,” in *Proc. of the 17th International Conference on Ubiquitous Robots (UR)*, Kyoto, Japan, June 22-26, 2020.
- 42) *Wicaksono, I., Kodama, E., Dementyev, A., and Paradiso, J.A., “SensorNets: Towards Reconfigurable Multifunctional Fine-grained Soft and Stretchable Electronic Skins,” in the *Proc. of ACM CHI 2020 Extended Abstracts*, Honolulu HI, April 25-30, 2020.
- 43) Sumini, V., Muccillo, M., Miliken, J., Ekblaw, A., and Paradiso, J., “SpaceHuman: A Soft Robotic Prosthetic for Space Exploration,” in the *Proc. of ACM CHI 2020 Extended Abstracts*, Honolulu HI, April 25-30, 2020.
- 44) *Cherston, J., Veyssset, D., Sun, Y., Yano, H., Nelson, K., Murari, S., and Paradiso, J.A., “Large Area Electronic Skins In Space: Vision and Preflight Characterization For First Aerospace Piezoelectric e-Textile,” in the *Proc. of the SPIE Conference on Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems*, Anaheim, CA, April 27-30, 2020.
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- 47) *Duhart, C., Dublon, G., Davenport, G., and Paradiso, J.A., “Deep Learning for Wildlife Conservation and Restoration Efforts,” in the *Proc. of the 36th Int. Conf. on Machine Learning (ICML 2019)*, Workshop on *Climate Change: How Can AI Help?*, Long Beach, California, Paper #31, June 2019.
- 48) *Ekblaw, A., Anastasia P., Newman, D., and Paradiso, J., "Space Habitat Reconfigurability: TESSERA platform for self-aware assembly," in the *30th IAA SYMPOSIUM ON SPACE AND SOCIETY* (Space Architecture: Habitats, Habitability, and Bases), *Proceedings of the IAF International Astronautical Congress*, October 21-25, 2019. **AIAA Space Architecture Technical Committee Best Professional Paper Award 2019/2020**
- 49) *Ramsay, D. and Paradiso, J., “Huxley: Intelligent Book as Essentialist Artefact,” in *Proc. Of DESFORM 2019*, Cambridge, MA., Oct. 9-11, 2019, pp. 233-236.
- 50) Duhart, C., Russell, S., Michaud, F., Dublon, G., Mayton, B., Davenport, G., Paradiso, J., “Deep Learning For Environmental Sensing Toward Social Wildlife Database,” in *Proc. of the 9th International Workshop on Climate Informatics*, Paris, France, October 2-4, 2019.
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- 53) *Haddad, D.D. and Paradiso, J.A., "The World Wide Web in an Analog Patchbay," in *Proc. of NIME 2019*, Porto Alegre, Brazil, June 3-6, 2019, pp. 407-410.
- 54) *Ananthabhotla, I., Ramsay, D., and Paradiso, J.A., "HCU400: An Annotated Dataset for Exploring Aural Phenomenology through Causal Uncertainty," in *Proc. of the IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP*, May 12-17, 2019, Brighton, UK, pp. 920-924.
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- 60) *Ekblaw, A. and Paradiso, J.A., "Self-assembling Space Architecture: Tessellated shell structures for space habitats," In *Proc. of AIAA Scitech 2019 Forum*, Smart/Adaptable Deployable Structures (paper AIAA 2019-0481), Jan. 6, 2019.
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- 62) *Dementyev, A., Qi, J., Ou, J., & Paradiso, J., "Mass Manufacturing of Self-Actuating Robots: Integrating Sensors and Actuators Using Flexible Electronics," in *Proc. of the 2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Madrid, Spain, October 1-5, 2018, pp. 6099-6104

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- 64) *Ekblaw, A. and Paradiso, J., “TESSERA: self-assembling shell structures for space exploration,” in *Proc. of the Annual Symposium of the International Association of Shell and Spatial Structures (IASS)*, Boston MA, July 16-20, 2018, p. 317-324.
- 65) Haddad, D.D. and Paradiso, J.A., “Kinesynth: Patching, Modulating, and Mixing a Hybrid Kinesthetic Synthesizer,” In *Proc. of NIME 2018*, Blacksburg, VA, June 3-6, 2018, pp. 35-36.
- 66) Richer R., Zhao N., Amores J., Eskofier B.M., Paradiso J.A., “Real-time Mental State Recognition using a Wearable EEG,” in *Proc. of the International Conference of the IEEE Engineering in Medicine and Biology Society*, July 17-21, 2018, Honolulu, HI, pp. 5495-5498.
- 67) *Qi, J., Buechley, L., and Paradiso, J.A., “Chibitronics in the Wild: Engaging New Communities in Creating Technology with Paper Electronics,” in *Proc. of ACM CHI 2018*, Montreal, Canada, April 21-26, 2018, Paper No. 242, pp. 1-11.
- 68) *Ekblaw, A. and Paradiso, J.A., “Self-assembling Space Structures: Buckminsterfullerene Sensor Nodes,” in *Proc. of the 2018 AIAA Sci Tech Forum / AHS Adaptive Structures Conference*, January 8-12, 2018, Kissimmee, Florida, Paper AIAA 2018-0565.
- 69) *Ananthabhotla, I. and Paradiso, J.A., “VisualSoundtrack: An Approach to Style Transfer in the Context of Soundtrack Prototyping,” in *Proc. of the International Computer Music Conference (ICMC) 2017*, Shanghai, China, October 15-20, 2017, pp. 341-346.
- 70) *Dementyev, A., Hernandez, J., Follmer, S., Choi, I., and Paradiso, J., “SkinBot: A Wearable Skin Climbing Robot,” in *Adjunct Proc. of ACM UIST’17*, October 22-25, 2017, Quebec City, QC, Oct. 22-25, 2017, pp. 5-6.
- 71) Vega, K., Jiang, N., Liu, X., Kan, V., Barry, N., Maes, P., Yetisen, A.K., Paradiso, J.A., “The dermal abyss: interfacing with the skin by tattooing biosensors,” in *Proceedings of the 2017 ACM International Symposium on Wearable Computers - ISWC ’17*, Maui, Hawaii, September 11-15, 2017, pp. 138-145. **Best Paper Award – Honorable Mention**
- 72) *Haddad, D. D., Dublon, G., Mayton, B., Russell, S., Xiao, X., Perlin, K., and Paradiso, J. A., Resynthesizing Reality: Driving vivid virtual environments from sensor networks,” in *ACM SIGGRAPH 2017 Talks*, Los Angeles, CA, July 30 – August 3, 2017, Article No. 51.
- 73) *Cherston, J. and Paradiso, J.A., “Space Webs as Infrastructure for Crawling Sensors on Low Gravity Bodies,” in *Proc. of the 31st Annual AIAA/USU Conference on Small Satellites (SmallSat)*, Logan, Utah, Aug. 1-6, 2017, Paper No. SSC17-P2-03.

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- 75) *Wicaksono, I. and Paradiso, J.A., “FabricKeyboard: Multimodal Textile Sensate Media as an Expressive and Deformable Musical Interface,” in *Proc. of NIME’17*, Copenhagen, Denmark, May 15-19, 2017, pp. 348-353.
- 76) Haddad, D.D., Xiao, X., Machover, T., and Paradiso, J.A., “Fragile Instruments Constructing Destructible Musical Interfaces,” in *Proc. of NIME’17*, Copenhagen, Denmark, May 15-19, 2017, pp. 30-33. **Best Presentation Award.**
- 77) *Qi, J., Demir, A., and Paradiso, J. A., “Code Collage: Tangible Programming On Paper With Circuit Stickers,” in *Proc. of the 2017 ACM CHI Conference (CHI’17), Extended Abstracts on Human Factors in Computing Systems*, Denver, Colorado, May 6-11, pp. 1970-1977.
- 78) Nakagaki, K., Dementyev, A., Follmer, S., Paradiso, J., and Ishii, H., ‘ChainFORM: A Linear Integrated Modular Hardware System for Shape Changing Interfaces,’ in *Proc. of ACM UIST 2016*, October 16-19, 2016.
- 79) Liu, X., Vega, K., Qian, J., Paradiso, J., and Maes, P., “Fluxa: Body Movements as a Social Display,” in *Adj. Proc. of UIST 2016*, October 16-19, 2016, pp. 155-157.
- 80) *Dementyev, A., Kao, H-L, Choi, I., Ajilo, D., Xu, M., Paradiso, J.A., Schmandt, C., and Follmer, S., ‘Rovables: Miniature On-Body Robots as Mobile Wearables,’ in *Proc. of ACM UIST 2016*, Tokyo, October 16-19, 2016, pp. 111-120. **Best Paper Award**
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- 83) *Cherston, J., Hill, E., Goldfarb, S. and Paradiso, J., “Musician and Mega-Machine: Compositions Driven by Real-Time Particle Collision Data from the ATLAS Detector,” in *Proc. of the NIME 2016 Conference*, Brisbane Australia, July 11-15, 2016.
- 84) *Lynch, E. and Paradiso, J.A., “SensorChimes: Musical Mapping for Sensor Networks,” in *Proc. of the NIME 2016 Conference*, Brisbane Australia, July 11-15, 2016.
- 85) Xiao, X, Haddad, D.D., Sanchez, T., van Troyer, A., Kleinberger, R., Webb, P. Paradiso, J., Machover, T., and Ishii, H., “Kinéphone: Exploring the Musical Potential of an Actuated Pin-Based Shape Display,” *Proc. of the NIME 2016 Conference*, Brisbane Australia, July 11-15, 2016.

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- 87) *Cherston, J., Hill, E., Goldfarb, S., and Paradiso, J.A., “Sonification Platform for Interaction with Real-Time Particle Collision Data from the ATLAS Detector,” in Proc. of *CHI 2016*, May 2016, pp. 1647-1653.
- 88) Liu, X., Vega, K., Maes, P., and Paradiso, J.A., ‘Wearability Factors for Skin Interfaces,’ in Proc. of the *ACM Augmented Human Conference*, Geneva Switzerland, Article No. 21, February 2016. **Best Paper Award (second prize)**.
- 89) *Russell, S., Dublon, G., and Paradiso, J.A., ‘HearThere: Networked Sensory Prosthetics Through Auditory Augmented Reality,’ in Proc. of the *ACM Augmented Human Conference*, Geneva Switzerland, Article 20, pp. 1-8, February 2016.
- 90) Azaria, A., Mayton, B., and Paradiso, J.A., “Thumbs-Up: Wearable Sensing Device for Detecting Hand-to-Mouth Compulsive Habits,” in Proceedings of the 9th International Joint Conference on Biomedical Engineering Systems and Technologies - Volume 1: BIODEVICES, (BIOSTEC 2016), February 2016, pages 54-65.
- 91) *Zhao, N., Aldrich, M., Reinhart, C.F., and Paradiso, J.A., “A multidimensional continuous contextual lighting control system using Google Glass,” in Proc. of the *2nd ACM International Conference on Embedded Systems For Energy-Efficient Built Environments (BuildSys 2015)*, Nov. 2015. **Best Presentation Award**
- 92) *Dementyev, A., Kao, H-L, and Paradiso, J.A., “SensorTape: Modular and Programable 3D-Aware Dense Sensor Network on a Tape,” in Proc. of *ACM UIST (User interface software and technology)* November, 2015.
- 93) Benavides, X., Zhu, Chang Long, Maes, P., Paradiso, Joseph A., “KickSoul: A Wearable System for Feet Interactions with Digital Devices,” in Proc. of *ACM UIST (User interface software and technology)* November, 2015.
- 94) Zhao, N. and Paradiso, J.A., “HALO: wearable lighting,” in Adjunct Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2015 ACM International Symposium on Wearable Computers, pp. 601-606, Sept. 7-11, 2015. **ISWC Design Exhibition Best Aesthetics Award**
- 95) Amores, J., Maes, P., and Paradiso, J., “Bin-ary: Detecting the State of Organic Trash to Prevent Insalubrity,” Ubicomp 2015 (ACM International Joint Conference on Pervasive and Ubiquitous Computing), Sept. 7-11, 2015.
- 96) Zhao, N., Dublon, G., Gillian, N., Dementyev, A., Paradiso, J., “EMI Spy: Harnessing Electromagnetic Interference for Low-Cost, Rapid Prototyping of Proxemic Interaction,” presented at the *2015 International Conference on Wearable and Implantable Body Sensor Networks (BSN '15)*, June 2015.

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- 98) Haddad, D.D., Tome, B., Machover, T., and Paradiso, J.A., “MMODM: Massively Multipler Online Drum Machine,” presented at *International Conference on New Interfaces for Musical Expression (NIME ’15)*, Baton-Rouge, LA, 2015.
- 99) Ramsay, D.B., and Paradiso, J.A., “GroupLoop: A Collaborative, Network-Enabled Audio Feedback Instrument,” presented at *International Conference on New Interfaces for Musical Expression (NIME ’15)*, Baton-Rouge, LA, 2015.
- 100) Kleinberger, R., Dublon, G., Paradiso, J.A., and Machover, T., “PHOX Ears: A Parabolic, Head-mounted, Orientable, eXtrasensory Listening Device presented at *International Conference on New Interfaces for Musical Expression (NIME ’15)*, Baton-Rouge, LA, 2015.
- 101) Kao, H-L., Dementyev, A., Paradiso, J.A., and Schmandt, C., “NailO: Fingernails as Input Surfaces,” in the *Proceedings of the International Conference on Human Factors in Computing Systems (CHI’15)*, Seoul Korea, April 2015, pp. 3015-3018. **Honorable Mention for Best Paper**
- 102) *Russell, S. and Paradiso, J.A., “Hypermedia APIs for sensor data: A pragmatic approach to the Web of Things,” in the *Proceedings of ACM Mobiquitous 2014*, London UK, December 2014, pp. 30-39.
- 103) *Dementyev, A. and Paradiso, J., “WristFlex: Low-Power Gesture Input with Wrist-Worn Pressure Sensors,” in the *Proceedings of UIST 2014, the 27th annual ACM symposium on User interface software and technology*, Honolulu Hawaii, October 2014, pp. 161-166.
- 104) *Goyal, P., Maes, P., Paradiso, J., “Nishanchi: CAD for hand-fabrication,” in the *Adjunct Proceedings of UIST 2014, the 27th annual ACM symposium on User interface software and technology*, Honolulu Hawaii, October 2014, pp. 63-64.
- 105) Gillian, N., Pfenninger, S., Russell, S., and Paradiso, J.A., “Gestures Everywhere: A Multimodal Sensor Fusion and Analysis Framework for Pervasive Displays,” In *Proceedings of The International Symposium on Pervasive Displays (PerDis ’14)*, Sven Gehring (Ed.). ACM, New York, NY, June 2014, pp. 98-103.
- 106) *Way, D. and Paradiso, J., “A Usability User Study Concerning Free-Hand Microgesture and Wrist-Worn Sensors,” In *Proceedings of the 2014 11th International Conference on Wearable and Implantable Body Sensor Networks (BSN ’14)*. IEEE Computer Society, June 2104, pp. 138-142.
- 107) Dublon, G, Paradiso, J. A., “FingerSynth: Wearable Transducers for Exploring the Environment and Playing Music Everywhere,” in *International Conference on New Interfaces for Musical Expression (NIME ’14)*, London, U.K., 2014, pp. 134-135.

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- 109) *Gong, N.-W., Steimle, J., Olberding, S., Hodges, S., Gillian, N., Kawahara, Y., and Paradiso, J., “PrintSense: A Versatile Sensing Technique to Support Multimodal Flexible Surface Interaction” In *Proceedings of the International Conference on Human Factors in Computing Systems (CHI'14)*, Toronto Canada, April 2014, pp. 1407-1410.
- 110) *Aldrich, M., Badshah, A., Mayton, B., Paradiso, J.A., “Random Walk and Lighting Control,” in *Proceedings of the 2013 IEEE Sensors Conference*, Baltimore, MD, November 2013, 4 pages.
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c. Other Major Publications:

Book chapters, invited conference, workshop, and exhibition articles, popular magazine articles

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- 123) Wexler, J. and Paradiso, J., "Extensions to, and Implementation of, 'A Methodology for Configuring Distributed Real Time Microcomputer Systems with Application to Inertial Navigation Systems'," Draper Laboratory Technical Report, CSDL-78-010, October 1976.

Draper Lab Technical Memoranda

- 124) Paradiso, J., "Design and Test of a Simple Peak-Gated Sampler," Draper Intralab Memorandum ESC-93-310, November 23, 1993.
- 125) Paradiso, J., "Backgammon Electronics: Past, Present, & Future," Draper Intralab Memorandum EJC-91-1100, October 13, 1991.
- 126) Paradiso, J., "The Backgammon Timing/Gating Utility," Draper Intralab Memorandum EJC 91-1101, October 12, 1991.
- 127) Paradiso, J., "The Quadrature Sampler," Draper Intralab Memorandum EJC 91-1029, May 30, 1991.
- 128) Paradiso, J., "Electronics for Testing the Wideband Monopulse Sonar," Draper Intralab Memorandum EJB-91-029, March 20, 1991.
- 129) Paradiso, J., "Sonar Application of a Quadrature-Sampled Interpolation Beamformer," Draper Intralab Memorandum EJB 90-191, December 31, 1990.

* Outgrowth of supervised thesis

- 130) Paradiso, J., "Methods of Smoothing CMG Gimbal Rates Calculated by Linear Programming," Draper Intralab Memorandum SpaceStation-87-20, November 20, 1987.
- 131) Paradiso, J., "Characteristics of Candidate Reaction Wheel Configurations for Satellite Attitude Control," Draper Intralab Memorandum NRL-87-1, October 1, 1987.
- 132) Paradiso, J., "Selection and Management of Magnetically Gimballed CARES Gyroscopes via Linear Programming," Draper Intralab Memorandum SpaceStation-86-19, December 1, 1986.
- 133) Paradiso, J., "An Efficient OFS-Compatible Kinematic Model for Generalized CMGs," Draper Intralab Memorandum SpaceStation 85-9, March 25, 1985.
- 134) Paradiso, J., "Versatek Software," Draper Intralab Memorandum MX/S-005, August 1, 1977.
- 135) Paradiso, J., "Sigma 5 Calcomp Plotting Package," Draper Intralab Memorandum, TEST-099-75, August 15, 1975.

Other Technical Reports

- 136) Paradiso, J., Borque, L., Bramsen, P., Laibowitz, M., Ma, H., and Malinowski, M., "Sensing Systems for Glass Ceramic Cooktops," Internal MIT Media Lab Report, July 18, 2003 (38 p).
- 137) Paradiso, J., "Scanfish Technical Description," Internal MIT Media Lab Report, April, 1995 (10 p). Available at: <https://resenv.media.mit.edu/EFS-Array/scanfish.pdf>
- 138) Paradiso, J., "Penn and Teller Séance Electronics," detailed description of the Media Lab's *Sensor Chair* design, Internal MIT Media Lab Report, December 1994 (68 p).
- 139) Paradiso, J., "Development of a τ Trigger," ETHZ and L3P Collaboration Final Report, October 30, 1992 (41 p).
- 140) Paradiso, J., "Oberheim 4-Voice MIDI Interface; Users Manual," Report for Lyle Mays, Inc, September 1991 (47 p).
- 141) Paradiso, J., "The Complete Technical Guide to WMFO," a tutorial on the design of a radio studio and associated electronics, March 1987 (283 p).
- 142) Paradiso, J., "Reaction Wheel Energy Storage," Draper Laboratory Internal Report, January 17, 1992 (50 p).
- 143) Paradiso, J., "A Brief Sketch of Proposed TEC Data Flow," ETH-Zurich Time-Expansion-Chamber (TEC) Group Technical Report, April 29, 1983 (6 p.).

* Outgrowth of supervised thesis

Publications of Joseph A. Paradiso (cont.)

- 144) Paradiso, J., "Description of TEC Analysis Utility Routines," ETH-Zurich Time-Expansion-Chamber (TEC) Group Technical Report, April 20, 1983 (16 p).
- 145) Paradiso, J., "The Design, Construction, and Operation of an Electronic Music Synthesizer," Tufts University Electrical Engineering Department Undergraduate Special Project Report (**Winner of the 1977 Burden Engineering Prize**), May 1977 (140 p).

* Outgrowth of supervised thesis

21. Invited Lectures, Seminars, Panels, Performances, and Exhibitions:

- 1) Opening Keynote, MIT/Harvard AI Film Hackathon, Cambridge MA, *Rise of Our Electronic Id*, February 16, 2025.
- 2) Invited Colloquium, EPFL Laboratory of Intelligent Systems, Lausanne Switzerland, *Towards Human Augmentation*, February 4, 2025.
- 3) Closing Keynote Lecture, CUSO Winter School on AI/Human Interaction, Champéry, Switzerland, *Approaching the Augmented Human*, Jan. 31, 2025.
- 4) Closing Keynote, Recanati Smart Land Conference, Recanati, Italy, *Wearable and Dense In-Situ Sensing for Building Control and Human Interaction*, July 4, 2024.
- 5) Kickoff Keynote, MIT Media Lab x Smart Living Lab Workshop, University of Fribourg, Switzerland, *An Introduction to Sensing, Hardware, and Visualization*, Jan. 15, 2024.
- 6) Panel Moderator, A3E Session at NAMM 2025, *Launching AI onto the Live Stage: Jordan Rudess on the Future of Generative AI for Live Music Performances*, Jan. 25, 2025.
- 7) Invited Lecture and Panel, MIT Faculty Leadership Seminar, Cambridge MA, *Some notes on MIT Leadership*, October 15, 2024.
- 8) Panel Moderator, Audio Engineering Society (AES 2025) Convention, New York, NY, *Towards AI-augmented Live Music Performances*, October 10, 2024.
- 9) Invited talk, MIT task force on the Future of the Arts at MIT, Cambridge MA, *Some Reflections on the Arts at MIT*, October 8, 2024.
- 10) Invited Panelist and Presenter at the 2024 DDes Conference, “RealTimeNature” at the Harvard Graduate School of Design Piper Auditorium, Cambridge MA, *Uncanny Valley Session*, September 27, 2024.
- 11) Invited talk, The 12th Edition of the Large Hadron Collider Physics (LHCP) Conference, Northeastern University, Boston MA, *Making Music From Physics & a tour through related projects at the MIT Media Lab*, June 7, 2024.
- 12) Invited Seminar, Epoch Foundation, Taipei, Taiwan, *Scaling Embedded Human Connection*, May 22, 2024.
- 13) Invited Seminar, TSMC Corporation, Taiwan, *Scaling Embedded Human Connection*, May 21, 2024.
- 14) Invited talk, Canadian Imperial Bank of Commerce (CIBC) AI Seminar, Cambridge, *A Saga of Sound, Sensing, Hardware, & AI*, May 1, 2024.
- 15) Invited talk, Martin Family Trust Dirt Road Session, MIT Cambridge, *Wearable and dense in-situ sensing for building control*, April 4, 2024.

- 16) Invited talk, MIT Morningside/HPI (Hans Plattner Institute) Seminar, Cambridge MA, *Sensing Systems for Environmental Monitoring*, March 21, 2024.
- 17) Invited Keynote, Festival of Learning, Institute for Future Technologies at the De Vinci Innovation Center, Paris, France, The Future of Sensory Entrepreneurship: Creating Human-Centered Experiences Session, *A Saga of Sound, Sensing, Hardware, and Visualization*, March 7, 2024.
- 18) Featured Lecture, Swiss Museum of Electronic Music (SMEM), Fribourg, Switzerland, *Hatched in Zürich and Honed at MIT - A Sonic Tour Through Time and Technology Featuring the Paradiso Synthesizer*, January 18, 2024.
- 19) Invited speaker to represent MIT, Alexander W. Dreyfoos Memorial, Kravis Center, West Palm Beach, Florida, *Remembering Alex Dreyfoos*, November 13, 2023.
- 20) Computer Science Department Colloquium, San Diego State University (SDSU), *Sensing and Connecting Across Scales*, November 3, 2023.
- 21) Invited Talk, Materials Science Department, FCT NOVA (Nova School of Science and Technology), Lisbon, Portugal, *Sensing and Connecting Across Scales*, October 18, 2023.
- 22) Invited Panelist, Body Sensor Networks Conference (BSN 2023), Cambridge MA, Session on: *The past, present, and Future of Body Sensing and Digital Health*, October 9, 2023.
- 23) Invited Keynote, AFFOA Annual Meeting, Boston, MA, *The Age of Sensate Media*, September 26, 2023.
- 24) Invited Academic Lecture, Qualcomm Inc., San Diego, CA, *Sensing and Connecting Across Scales*, August 21, 2023.
- 25) Invited Talk, Centre for Interdisciplinary Research in Music Media and Technology (CIRMMT) Scientific Event and General Assembly, Montreal Canada, *Knitted Textiles for Musical Control and Interaction*, May 25, 2023.
- 26) Invited Lecture, New England Synthfest Spring Meeting, Burlington MA, *Between My Basement and the Media Lab: Designing New Synth Modules, Cool Hacks, and Musical Controllers*, April 22, 2023.
- 27) Invited Opening Keynote, Harvard Reality Hackathon, Cambridge MA, *Take Me To Your Future*, April 14, 2023.
- 28) Invited Seminar, Amazon Robotics, North Reading MA, *Sensing and Connecting Across Scales*, March 17, 2023.
- 29) Invited Keynote, Institute for Future Technologies at the De Vinci Innovation Centre (DVIC), Paris France, *Sensing and Connecting Across Scales*, March 9, 2023.

Presentations by Joseph A. Paradiso (cont.)

- 30) Discussion Leader, ‘Sisters With Transistors’ screening at Bartos Theater, Cambridge MA, *Launched discussion and led Q&A on the historical role of women in electronic music*, March 3, 2023.
- 31) Invited Opening Keynote, MIT Reality Hackathon, Cambridge MA, *Take Me To Your Future*, January 12, 2023.
- 32) Invited Talk in the “Beyond The Elephant In The Room” Symposium, MIT Media Lab Southeast Asia Forum, Bangkok, Thailand, *Living in X-Reality: The Generalization of Presence as Real and Virtual Collide*, December 19, 2022.
- 33) Invited Talk in the “Beyond The Elephant In The Room” Symposium, MIT Media Lab Southeast Asia Forum, Bangkok, Thailand, *Some Perspectives on Humans and Space*, December 19, 2022.
- 34) Invited Panelist, IEEE Metaverse Congress, Session 5: Behind and Beyond the Metaverse, Online Webinar, *XV (eXtended meta/uni/Verse) Panel*, December 8, 2022.
- 35) Invited Lecture, McKinsey Digital NA Leadership Summit, Boston MA, *Living in Metaversality: The Generalization of Presence as Real and Virtual Collide*, May 3, 2022.
- 36) Invited Keynote, Osmocosm ’22 Conference, Cambridge MA, *Scalable Presence: The Multi-Sensory Nature of Future Media*, October 20, 2022.
- 37) Invited Keynote, European Workshop on Wireless Sensor Networks (EWSN 2022), Linz Austria, *Sensing and Connecting Across Scales*, October 4, 2022.
- 38) Invited Talk, NSF Workshop on The Thermodynamics of Natural and Artificial Distributed Computational Systems, Santa Fe Institute, Santa Fe, New Mexico, *Sensor Network Testbeds*, August 15, 2022.
- 39) Opening Keynote, Wearable Technologies 2022, San Francisco, CA, *Looking Past The Goggles: New Ways Wearables Will Bridge Real & Virtual*, July 26, 2022.
- 40) Invited JPL-Wide Talk, NASA Jet Propulsion Laboratory (streamed online), *Sensing and Connecting Across Scales*, July 19, 2022.
- 41) Invited Talk, International Conference on Learning Representations (ICLR), AI for Earth Science Workshop, *Connecting With A Restored Wetland Via a Large-Scale Multimodal Sensor Deployment*, Online Session, April 29, 2022.
- 42) Invited Lecture, ‘Designers Worth Knowing’ Speaker Series, Technology Leaders Program, University of Virginia, *A Selection of Recent ResEnv Work*, February 24, 2021.
- 43) Invited Presentation, Distinguished Engineers Meeting, Honeywell, Inc., (online), *Sensor Systems Across Scales*, February 23, 2022.

- 44) Special Briefing to Comcast Technical Management (video segment), *Experience Re-Experienced*, February 11, 2021.
- 45) Invited Panelist, IEEE BSN/BHI 2021 (online), BHI-BSN Roadmap: The Celebration – Godfathers of BSN Segment, *BSN Retrospective*, July 28, 2021.
- 46) Invited Panelist, MIT Department Heads Meeting, Special Panel on *Engaging with Students*, Online, July 15, 2021.
- 47) Invited Panelist, MIT New Faculty Orientation, Special Panel on *Handling Challenging Meetings with Student Advisees*, August 31, 2021.
- 48) Invited Lecture, Politecnico Milano, Design Exploration: Towards a Moon Architecture Seminar Series, *Some Perspectives on Humans and Space*, September, 22, 2021.
- 49) Invited Interview with Gerfried Stocker (director), Ars Electronica Festival, Linz Austria, *Art Thinking*, Session on Ars Electronica Channel, September 12, 2021.
- 50) Invited Keynote Speaker, Pro²Future Partner Conference and HQ Opening, Johannes Kepler Universität (JKU), Linz, Austria, *What's New at ResEnv (with a touch of AI)*, Sept. 9, 2021.
- 51) Invited Keynote Talk, 25th Anniversary of the Graduate School of Informatics, Middle East Technical University (METU), Ankara, Turkey (online), *Examples of How AI, Shared Environments, & Distributed Sensing are Changing Interaction*, October 22, 2021.
- 52) Invited Lecture, Politecnico Milano, Design Exploration: Architecture for Human Space Exploration, *Some Perspectives on Humans and Space*, November, 20, 2020.
- 53) Invited Seminar, University of Bologna, EE Department, *Sensory Augmentation in a Post-IoT World*, February 16, 2020
- 54) Invited Opening Lecture, EU Copernicus ‘Space Economy’ Hackathon, Vincenzo, Italy, *Hacking for Space*, February 15, 2020.
- 55) Keynote Lecture, 1st Summit for Digital and Space Economy for SMEs, Vincenzo, Italy, *Space: Yesterday's Dreams, Today's Boom, Tomorrow's Reality*, February 14, 2020.
- 56) Invited talk, NSF Tripod Grant Kickoff, Tufts University, Medford MA, *Data as the Canvas of Future Artists*, January 31, 2020.
- 57) Invited lecture, ETH Circle Spotlight Event at the ETH Pavilion at Davos, Switzerland, *Building Synthesizers at ETHZ in 1983*, January 23, 2020.
- 58) Invited panelist, Rethinking Creativity Session at the ETH Pavilion at Davos, Switzerland, January 22, 2020.

- 59) Podcast Session, ETH News, *Joe Paradiso and his passion for the sound of the ETH parking garage*, Recorded February 20, 2020, Posted at: <https://ethz.ch/en/news-and-events/eth-news/news/2020/01/podcast-joe-paradiso.html> .
- 60) Opening keynote, MIT AR Hackathon, MIT 10-250, Cambridge MA, *Welcome To Our Networked Future in a Post-IoT World*, January 16, 2020.
- 61) Invited talk, TU Berlin, Institut für Ökologie, Smart Nature Session for Tegel Projekt Leadership, *Tidmarsh @ Tegel*, December 4, 2019.
- 62) Invited talk at the Colloque Léonard de Vinci, ESILV Pole Léonard de Vinci, La Défense, Paris, *La recherche – Les Sciences: Forges For Future Leonardos*, 12/3/2019.
- 63) Invited talk, MIT Future of Fabric Summit, Cambridge MA, *Smart Fabrics for Responsive Environments*, November 22, 2019.
- 64) Keynote Lecture, Texas Wireless Summit, UT Austin, *How We Will Connect To Our Networked Future in a Post-IoT World*, November 12, 2019.
- 65) Keynote Lecture, 50 Jahre Informatik an der JKU Celebration, Johannes Kepler Universität, Linz Austria, *How We Will Connect To Our Networked Future in a Post-IoT World*, November 8, 2019.
- 66) Invited Seminar, Analog Heaven Northeast (AHNE) Event, Burlington, MA, *Designing and fielding custom synths & music controllers over a quasi-lifetime*, September 19, 2019.
- 67) Invited Lecture, Fraunhofer IML, Dortmund Germany, *An Introduction to ResEnv, The Media Lab, and Beyond*, September 25, 2019.
- 68) Invited Talk, NASA/JPL, Pasadena California, *An Introduction to ResEnv, The Media Lab, and Beyond*, September 12, 2019.
- 69) UC Berkeley EECS Colloquium, *How We Will Connect to Our Networked Future in a Post-IoT World*, Berkeley, CA, September 4, 2019.
- 70) MIT New Faculty Orientation Seminar, *Some notes on building your research team,* MIT Samberg Center, August 28, 2019.
- 71) Invited Talk, University of Dortmund Engineering and Logistics Depts, *Looking Past the Internet of Things – How We Will Connect To Our Networked Future*, Dortmund Germany, May 22, 2019.
- 72) Panel Leader, MIT Faculty Leadership Program, Work Design and Personal Productivity Segment, *Time Management Session*, Samberg Center, MIT Cambridge, May 30, 2019.
- 73) Kickoff lecture and panel chair, *The Future of Homo Sapiens* Event, MIT 26-100, Cambridge MA, March 7, 2019.

Presentations by Joseph A. Paradiso (cont.)

- 74) Black Mirror Technical Seminar, MIT Media Lab, Cambridge MA, *Prelude to Metalhead – Power Management, Ubicomp, Localization, & Drones...*, February 21, 2019.
- 75) Invited Lecture, MIT Super-UROP Seminar, MIT Stata Center, *Responsive Environments for Super UROPs*, February 14, 2019.
- 76) Invited Talk, NASA/TRISH Workshop on Spaces in Space: Optimizing Behavioral Health and Cognitive Performance in Confined Environments, *Towards Responsive Environments for Space Missions*, February 7, 2019.
- 77) Invited Talk, HubMontreal, Montreal QC, Canada, *How Humans will Connect to Our Networked Future*, November 14, 2018.
- 78) Invited Talk to the AMS Collaboration, CERN Geneva, Switzerland, *Looking Past The Internet of Things – How Humans Will Connect To Our Networked Future*, November 6, 2018.
- 79) Invited Keynote, Ergo'IA Conference, Biarritz, France, *Looking Past The Internet of Things (from an anti-disciplinary perspective)*, October 4, 2018.
- 80) Invited Keynote, Human Experience and Technology: Future Perspectives Symposium, University of Macerata, Italy, *How Humans Will Connect To Their Environments in the PostApp Age*, October 17, 2018.
- 81) MIT New Faculty Orientation Seminar, *Some notes on building your research team,* MIT Samberg Center, September 24, 2018.
- 82) Invited Talk, MIT Science and Engineering Program for Teachers, MIT Building 26 TEAL Center, Cambridge MA, *From Smart Buildings to Smart Planets – A Personal Voyage...*, June 29, 2018.
- 83) Invited Lecture, Beyond Smart Cities Professional Course, MIT Media Lab, Cambridge, MA, *From Smart Buildings to Smart Planets*, June 27, 2018.
- 84) Invited Talk, Workshop on On-Body Interaction: Embodied Cognition Meets Sensor/Actuator Engineering to Design New Interfaces, Schloss Dagstuhl (Leibnitz Center for Informatics), Germany, *What is a Wearable*, May 21, 2018.
- 85) Invited Talk, TechConnect 2018, Anaheim, CA, *Beyond Visualization- Vivid Frameworks for Ubiquitous Sensor Data*, May 15, 2018.
- 86) Invited Talk, MIT International Office Hangzhou/Wanxiang Seminar, *From Smart Buildings to Smart Planets*, Hangzhou China, March 21, 2018.
- 87) Invited Talk and Panelist, SXSW 2018 (Technology + Buildings: Creating a New Experience), Austin TX, *From Smart Buildings to Smart Occupants*, March 13, 2018.

- 88) Panel Moderator, 'Our Sci-Fi Space Future' panel, Beyond The Cradle symposium, MIT Media Lab, Cambridge MA, March 10, 2018.
- 89) Invited Talk and Panelist in Session EC11 – Teaching Electronic Musical Instrument Design: Technologies and Techniques, Audio Engineering Society Annual Meeting (AES'17), Javits Center, New York City, *15 Years of Teaching Musical Controllers, etc. @ The MIT Media Lab*, October 20, 2017.
- 90) Opening Keynote, IOT Solutions World Congress (IOTSWC), Barcelona Spain, *Live After The App – How Humans Will Connect With The Internet of Things*, October 3, 2017.
- 91) Panelist in AI and IoT session, IOT Solutions World Congress (IOTSWC), Barcelona Spain, October 5, 2017.
- 92) Invited Talk, MIT ESI/CI Workshop on Advancing Conservation with Artificial Intelligence, Samberg Center, MIT Cambridge, *Connecting to The Tidmarsh Wildlife Sanctuary*, September 18, 2017.
- 93) Invited NASA/JPL LEAP Innovation series talk, NASA/JPL, Pasadena, CA, *How Humans Will Connect to Ubiquitous Sensing*, July 25, 2017.
- 94) Invited Talk, 2017 UW CSE/MSR Summer Institute - "Unpacking the Future of IOT," *Pre-Cognitive Human Extension as the Future of IoT*, August 1, 2017.
- 95) Invited Talk, Annual MIT President's CEO Advisory Board Meeting, Samberg Center, MIT Cambridge, *How Humans Will Connect to The Internet of Things*, June 21, 2017.
- 96) Invited Talk, 'Electronically-Augmented Instruments' Session of the Acoustics Society of America (ASA) Annual Meeting, Boston MA, *Astounding Sounds, Amazing Music at the Crossroads of Audio Control*, June 26, 2017.
- 97) Invited Talk, Nordic Smart Building Convention, Helsinki Finland, *Smart Spaces as Pre-Cognitive Human Extension*, June 15, 2017.
- 98) Invited Lecture, Open Music Initiative Workshop, IDEO Studio, Cambridge MA, *Music <-> Data*, June 6, 2017.
- 99) The Dennis Gabor Lecture, Imperial College Electrical Engineering Department, London UK, *Life After The App – How Humans Will Connect to Ubiquitous Sensing*, May 25, 2017.
- 100) Invited Colloquium, University of Aveiro, Portugal, *Augmented Human Interaction with Nature, Buildings, and Things*, May 3, 2017.
- 101) Invited Colloquium, University of Aveiro, Portugal, *Two Decades of Responsive Environments at the MIT Media Lab*, May 5, 2017.

Presentations by Joseph A. Paradiso (cont.)

- 102) Invited Colloquium, Technical University of Lisbon (Instituto Superior Técnico Lisboa), Lisbon, Portugal, *Life After The App – How Humans Will Connect To The Internet of Things*, May 2, 2017.
- 103) Panel Participant, ‘The Future of Space Research’ panel, Beyond The Cradle symposium, MIT Media Lab, Cambridge MA, March 12, 2017.
- 104) Invited Talk, Dagstuhl Workshop on Ambient Notification Environments, Schloss Dagstuhl, Germany, *Notifications vs. Augmentation*, April 17, 2017.
- 105) Invited Lecture, Singularity U, INK India, Mumbai, *Life After IoT*, April 8, 2017.
- 106) Invited Lecture, Voltage Connect Conference, Berklee School of Music, Boston, MA., *The Modular Resurgence – Déjà vu or Something New?*, March 11, 2017.
- 107) Invited Talk, MIT Living Observatory Summit, MIT Cambridge MA, *Sensing & Interaction for the Networked Landscape*, March 1, 2017.
- 108) Invited Panelist, *Future of Wireless Session*, IEEE Globecom 2016, Washington DC, December 7, 2016.
- 109) Invited Inspirational Lecturer, YouthConnect 2016, Expo 2020, Dubai UAE, 19 November 2016.
- 110) Keynote Lecture, Intel Software Professionals Conference, Hillsboro Oregon, *Beyond IoT – Ubiquitous Sensing and Human Experience*, October 19, 2016.
- 111) Invited Colloquium, Johannes Kepler University, Linz Austria, *Beyond IoT – Ubiquitous Sensing and Human Experience*, September 2016.
- 112) Invited Panelist and talk, Ars Electronica 2016, Linz Austria, ‘Radical Atoms’ Panel, *From Sensory Landscapes to Radical Subatoms*, September 9, 2016.
- 113) Keynote Lecture, IEEE PIMRC 2016, Valencia Spain, *Beyond IoT – Ubiquitous Sensing and Human Experience*, September 6, 2016.
- 114) Invited Colloquium, Bose Corporation, Framingham MA, *Beyond IoT – Ubiquitous Sensing and Human Experience*, August 27, 2016.
- 115) Invited talk in the ‘Personalized Computing with Interconnected Wearables’ session *Fun With Wearables*, at the 17th Annual Microsoft Research Summit, Redmond WA, July 13-15, 2016.
- 116) Kickoff Lecture, MIT & Berklee School of Music’s Open Music Initiative, *Some Musical Frontiers*, Cambridge MA, July 11, 2016.
- 117) Invited Lecture, Institut des Systèmes Complexes, Paris France, *Beyond IoT – Ubiquitous Sensing and Human Experience*, June 21, 2016.

- 118) Keynote Lecture, MIT World Real Estate Forum, *Beyond IoT – Ubiquitous Sensing and Human Experience*, May 19, 2016.
- 119) Invited talk at the *Environmental IoT: Taking Advantage of Chile's Natural Laboratories Conference*, Santiago, Chile, April 18-19, 2016.
- 120) Invited Talk at the ATLAS Outreach Session, CERN Geneva, *A Collaboration Between ATLAS and the MIT Media Lab to Build a Generalized Framework for Data-Driven Music*, February 23, 2016.
- 121) Video Lecture on sensing applications for the Internet of Things for the EDx Online Course *Connected World: Technology of The Internet Of Things (IoT)*, 2016.
- 122) Invited talk, Qualcomm Inc., *Beyond IoT - Ubiquitous Sensing and Human Experience*, San Diego CA, December 9, 2015.
- 123) Invited panelist, IEEE GlobeComm 2015, *Wearables: Our Experiences and Thoughts for the Future*, San Diego CA, December 8, 2015.
- 124) Distinguished Lecture Series, University of Michigan Computer Science and Engineering Dept., Ann Arbor MI, *Connecting with the Emerging Nervous System of Ubiquitous Sensing*, November 6, 2015.
- 125) Invited Panelist and talk, Chicago Ideas Week 2015, Chicago, IL, *Disruptive Innovation*, October 15, 2015.
- 126) Invited talk, Visualized 2015, *Redefining Presence Through Ubiquitous Sensing*, New York, NY, October 8-9, 2015.
- 127) Invited talk, Capital Magazine's Internet of Things Summit Meeting, Istanbul, Turkey, *Beyond IoT - Connecting with the Emerging Nervous System of Ubiquitous Sensing*, September 30, 2015.
- 128) Invited keynote, IoT Solutions World Congress (IoTS), Barcelona Spain, *Things That Think*, September 17, 2015.
- 129) Invited talk, KTH iPack Center Annual Meeting, Stockholm (Svartsjö), Sweden, *Beyond IoT – Ubiquitous Sensing and Human Experience*, August 28, 2015.
- 130) Invited talk, Huawei Strategy and Technology Workshop (STW), Shenzhen China, *Beyond 'Big Data' – Ubiquitous Sensing and how it will interact with people*, May 20, 2015
- 131) Invited talk, Toshiba Corporate R&D Center, Network System Laboratory, Kawasaki Japan, *At the Edges of 'Big Data'*, March 26, 2015.
- 132) Invited talk and panelist, Safecast Conference 2015, Tokyo Japan, *Art x Science – Connecting People to Environmental Sensing*, March 22, 2015.

Presentations by Joseph A. Paradiso (cont.)

- 133) Invited talk, Strategies in Light Conference, Las Vegas, NV, *New Interface Paradigms for Lighting Control*, February 26, 2015.
- 134) Invited keynote lecture, Guthman Musical Instrument Competition, Georgia Tech, Atlanta GA, *40 Years of Music & Technology in 20 Minutes*, February 20, 2015.
- 135) Invited panelist at the 2015 Harvard National Collegiate Research Conference (NCRC), Environmental Engineering session, January 23, 2015.
- 136) Welcome address, MIT Media Lab India's Design Innovation Workshop, PDPU, Gandhinagar, India, January 17, 2015.
- 137) Invited talk, Smart Device Innovation Science Team, Intel Corporation, Santa Clara CA, *At the Edges of 'Big Data'*, November 10, 2011.
- 138) Invited panelist and talk, Re-Think Food Conference, Culinary Institute of the Arts, St. Helena CA, *The Virtualization of Food*, November 9, 2011.
- 139) Invited conference keynote, IEEE Dallas Circuits and Systems Conference 2014, University of Texas at Dallas, TX, *At the Edges of 'Big Data'*, October 13, 2014.
- 140) Invited panelist and talk, 2014 LVP (Longworth Venture Partners) Tech Gathering, Internet of Things Panel, Cambridge MA, October 6, 2014.
- 141) Invited talk, MIT Physics Dept. Faculty Lunch Seminar, MIT Cambridge MA, *At the edges of 'Big Data'*, September 25, 2014.
- 142) Invited talk and panelist, MIT-KIT (Kerberos and Internet Trust) Annual Conference, Cambridge MA, *At the Edges of 'Big Data'*, September 18, 2014.
- 143) Invited video interview, panel discussion, and mini documentary about the future of networked sensors and our Tidmarsh Project, *John Roese – ReallTy*, EMC Innovation Network, September 11, 2014, <https://community.emc.com/docs/DOC-36727>.
- 144) Invited Keynote Speaker, Annual Retreat for the Intel Science and Technology Center for Pervasive Computing (ISTC-PC) at U. Washington, Alderbrook Resort, WA, *At the Edges of 'Big Data'*, August 12, 2014.
- 145) Faculty representative and conference panelist, Hackathon Natura Campus Media Lab, Natura Campus, Cajamar SP, Brazil, August 6, 2014.
- 146) Invited talk, MIT Media Lab @ Tokyo 2014, Tranomon Hills Forum, Tokyo Japan, *Where Big Data Touches People* July 10, 2014.
- 147) Invited corporate talks in Japan: NEC Research Lab, Kawasaki; TOPPAN, Koishikawa, Panasonic Headquarters, Osaka; Toshiba R&D Center, Kawasaki, *Where Big Data Touches People*, July 7-9, 2014.

- 148) Session host and speaker, Forum Academy Global Technology Outlook Online Lecture Series on Sensor Networks, World Economic Forum, July 2014:
https://forumacademy.weforum.org/courses/ForumAcademy/PLM14101/Summer_2014/about
- 149) Invited talk and coordinator of the Sensors Track for the MIT Media Lab Boost Week In Kenya, iHub Nairobi, *Where Big Data Touches People*, May 26, 2014.
- 150) Invited panelist, Together Festival, 'I Dream of Wires Documentary Screening and Discussion,' ICA Boston, May 18, 2014.
- 151) Outreach lecture, Brooks Elementary School, Medford MA, *A Tour Through Space, as We Search for Extraterrestrial Life*, April 30, 2014.
- 152) Invited session organizer and presenter, 'New Musical Frontiers @ the MIT Media Lab,' Moogfest 2014, Asheville North Carolina, *Musical Machines*, April 25, 2014.
- 153) Invited colloquium, TU Delft (Delft University of Technology), Department of Radiation Science & Technology, Delft, Netherlands, *Where Big Data Meets People*, April 17, 2014.
- 154) Invited panelist and talk, Machine Fantasies: A Workshop on Music Technologies–Past, Present, and Future ('Futures' Session), Tufts University, Medford MA, April 5, 2014.
- 155) Invited talk, 2014 EMC Technology Conference (D² - Disruptive Discovery), Cambridge MA, *Where Big Data Meets People*, April 3, 2014.
- 156) Invited keynote, Intel IPG Leadership Summit, Folsom CA, *Where Big Data Meets People*, March 5, 2014.
- 157) Invited talk and coordinator of the Sensors and Networks track for the Media Lab 2104 CREATE | ITERATE | INNOVATE Workshop, *Where Big Data Meets People*, Abu Dhabi, UAE, February 27, 2014.
- 158) Invited keynote, Design Innovation Workshop, WeSchool, Mumbai India, *Where Big Data Meets People*, February 1, 2014.
- 159) Invited colloquium, CEA Saclay Nano-INNOV, Paris France, *Where Big Data Meets People*, December 13, 2013.
- 160) Invited talk, Energy Harvesting & Storage USA, Santa Clara, CA, *Where Big Data Meets People*, November 21, 2013.
- 161) Invited panelist and talk, MIT Energy Initiative's 2013 Fall Research Conference, Cambridge MA, 'Potential Impacts of Big Data' Session, *Where Big Data Meets People*, October 3, 2013.

- 162) Invited lecture, 2013 International Symposium on Creative New-Media Performance, Shanghai Theatre Academy, Shanghai China, *Redefining Presence, Documentary, and Music – Media Transformation in the Age of Ubiquitous Computing*, September 29, 2013.
- 163) Invited keynote lecture, IEEE Custom Integrated Circuits Conference (CICC) 2013, San Jose CA, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, September 24, 2013.
- 164) Invited presentation, World Economic Forum Summer Davos, Dalian, China, IdeasLab: Rethinking Education with the Massachusetts Institute of Technology, *Learning in the Age of the Augmented Human*, Dalian China, September 11, 2013.
- 165) Invited talk, Annual Workshop of the iPack Center at KTH, Stockholm, Sweden, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, August 30, 2013.
- 166) Invited talk, ‘Curious Minds’ Lecture Series, Steelcase Inc., Grand Rapids, Michigan, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, July 30, 2013.
- 167) Invited lecture, HCC Summer School, IRCAM Paris, France, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, July 19, 2013,
- 168) Invited lecture, The MITRE Institute, Bedford MA, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, June 18, 2013.
- 169) Invited talk, Nokia Research Center (NRC), Sunnyvale CA, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, June 7, 2013.
- 170) Invited conference keynote, Sensors Expo, Chicago, IL, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, June 5, 2013.
- 171) Invited keynote speaker, EU HCC (Human-Computer Confluence) Visions Meeting, Barcelona Spain, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, May 17, 2013.
- 172) Invited talk, 2013 Future of Health Technology Summit, Cambridge MA, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, May 6, 2013.
- 173) Invited talk, 2013 MIT ICT Conference, Cambridge MA, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, April 25, 2013.
- 174) Interview filmed for Physics World, *Networked Environments of the Future*, April 11, 2013, <http://physicsworld.com/cws/article/multimedia/2013/apr/11/networked-environments-of-the-future>.
- 175) Invited colloquium, Qualcomm San Diego, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, April 2, 2013.

Presentations by Joseph A. Paradiso (cont.)

- 176) Invited lecture, Wilfrid Laurier University, EMTM Executive Breakfast Series, Waterloo Ontario, *Our Electronic Nervous System*, March 5, 2013.
- 177) Invited talk, Deloitte, Washington D.C., *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, January 29, 2013.
- 178) Invited talk, CERTI Laboratories, Florianópolis, Brazil, *Connecting Deeply Embedded Sensing to People*, November 20, 2012.
- 179) Invited talk, Embraer S.A., São José dos Campos, Brazil, *Connecting Deeply Embedded Sensing to People*, November 19, 2012.
- 180) Invited talk, Energy Harvesting & Storage and Wireless Sensor Networks & RTLS USA 2012 Conference, Washington D.C., *Leveraging Embedded Sensing for Energy Management*, November 8, 2012.
- 181) Keynote address, Annual TI Fellows Meeting, University of Texas, Dallas TX, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, October 18, 2012.
- 182) Invited panelist and talk, MITEI Annual Fall Energy Research Conference, Cambridge MA, “Advanced Building Technology” Session, *New Paradigms in Energy Management*, October 5, 2012.
- 183) Invited panelist, talk, and workshop participant, EPRI National Energy Efficiency Technology Summit, Portland OR, *New Paradigms in Lighting Control & Energy Management*, Sept. 25-26, 2012.
- 184) Invited panelist and talk, World Economic Forum Summer Davos, Dalian, China, ‘Imagineering our Future’ Session, September 13, 2012.
- 185) Invited presentation, World Economic Forum Summer Davos, Dalian, China, IdeasLab - Creating Smart Environments with the Massachusetts Institute of Technology, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, Dalian China, September 11, 2012.
- 186) Invited participant and talk, Interaction Beyond the Desktop, Schloss Dagstuhl Leibniz-Zentrum für Informatik Workshop, Wadern Germany, *Interaction Beyond The Desktop*, August 26-31, 2012.
- 187) Invited talk, Wearable Technologies (WT) Conference 2012, San Francisco, CA, *Wearable Systems as a Link to Ubiquitous Sensing and Actuation*, July 24, 2012.
- 188) Invited talk, Google Future of Mobile Workshop, Google Research, Mountain View, CA, *Wearables to Anchor User Experience In Smart Environments*, May 23, 2012.
- 189) Invited talk, Nokia’s Lunch & Speaker Series, Nokia Labs, Cambridge MA, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, May 15, 2013.

- 190) Invited seminar, CREAT-ISS Summer School, McGill University, Montreal Canada, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, May 4, 2012.
- 191) Invited panelist and talk, "Future City - MITEI Forum #3 - Built Environment, Urban Systems, and Energy," Session on "Human Systems and Behavior," *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, Cambridge MA, April 30, 2012.
- 192) Invited talk and discussion, Together Festival 2012, MIT Museum, Cambridge MA, *Modular Synths, etc.*, April 7, 2012.
- 193) Invited keynote talk, Intel PCCG Tech Summit, Portland OR, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, April 12, 2012.
- 194) Invited keynote talk, Design Innovation Workshop, Apeejay Styra University, New Delhi, India, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, March 30, 2012.
- 195) Invited colloquium, Apeejay College Of Fine Arts, Jalandhar, India, *From Musical Controllers to...*, March 29, 2013.
- 196) Invited keynote talk, MIT Technology Review's EmTech India 2012, Bangalore, *Connecting with the Emerging Nervous System of Ubiquitous Sensing*, March 28, 2012.
- 197) Invited talk, SRC/NSF/SFI Forum on Integrated Sensors for Cybersystems (FISC-2030), Session on "Sensors for Physical World Interfaces: Application Landscape for Future Integrated Sensors," Carton House, Maynooth, Co. Kildare, Ireland, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, March 23, 2012.
- 198) Panelist and talk, MIT Council on the Arts Event: *Sound and Real-Time Systems*, Bartos Theater, MIT Cambridge, MA, February 15, 2012.
- 199) Special seminar, Media Lab 2012 Festival of Learning (January 28) and repeated upon student demand (February 13), Cambridge MA, *An Armchair Tour Through Frontier Physics*.
- 200) Special seminar, Media Lab 2012 Festival of Learning, Cambridge MA, *Extreme Rock from Japan*, January 27, 2013
- 201) Invited talk, *Research Visions*, and workshop, *Pervasive Sensing and Smart Energy* at the MIT Media Lab @Tokyo 2012 Symposium, Dentsu Hall, Tokyo Japan, January 17, 2012.
- 202) Invited talks in Japan: Nihon Unisys (NUL-G), Tokyo; DENSO HQ, Kariya; Sony Head Office, Shinagawa, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, January 16-19, 2012.
- 203) Invited talk, EU Future Emerging Technologies (FET) Human-Computer Confluence Consultation Workshop, Brussels Belgium, *Connecting to the Emerging Nervous System of Ubiquitous Sensing*, December 1, 2011.

- 204) Invited colloquium speaker, Tufts Music Dept., Medford MA, *Interaction in the Post-Convergence Age – From Electronic Music Controllers to Ubiquitous Dynamic Media*, November 14, 2011.
- 205) Invited talk, Tyndall Institute, Cork Ireland, *Living with Ubiquitous Sensing and Dynamic Responsive Media*, October 28, 2011.
- 206) Invited 3-lecture seminar, Transitio Festival Workshops, Mexico City, *Musical Control and Interaction from 1900 to 2020*, October 3-6, 2011.
- 207) Invited art/technology talk, Transitio Festival Symposium, Mexico City, Lugar/Espacio/Interfaz Session, *Untitled*, October 3, 2010.
- 208) Invited talk, One-Handed Musical Instruments (OHMI) Launch Event, Ars Electronica Center, Linz Austria, *Towards OHMI Instruments*, September 4, 2011.
- 209) Invited talk, Schneider Electric Research Center, Grenoble France, *Living with Ubiquitous Sensing and Dynamic Responsive Media*, July 1, 2011.
- 210) Invited talk, INRIA In-Tech Symposium on Intelligence ambiante : évolution ou révolution?, INRIA Grenoble, France, *Living with Ubiquitous Sensing and Dynamic Responsive Media*, June 30, 2011.
- 211) Invited panelist and talk, MIT 150 Forum on Future Cities, *Changing Cities*, Cambridge MA April 12, 2011.
- 212) Invited talk, 2011 MIT Europe Conference – Innovation in a Networked World: Technology, People, and Places, Vienna Austria, *Living with Ubiquitous Sensing and Dynamic Responsive Media*, March 24, 2011.
- 213) Event Co-Organizer and *Mammoth Modular Synthesizer* Music Installation, Music | Machines – 50 Years of Music and Technology @ MIT, Cambridge MA, February 5, 2011.
- 214) Invited keynote, Design Innovation India Workshop, College of Engineering, Pune India, *Living with Ubiquitous Sensing and Dynamic Responsive Media*, January 28, 2011.
- 215) Cisco Distinguished Lecture, *Living with Ubiquitous Sensing and Dynamic Responsive Media*, Cisco Headquarters, Milpitas CA, January 13, 2011.
- 216) Invited talk, MIT MTL/MITEI Workshop on Next Generation μ -Energy Systems, Cambridge MA, *Applications and Requirements of Self-Powered Systems*, December 3, 2010.
- 217) Invited talks in Japan: NEC Central Research Labs, Kawasaki; ALPS Tokyo; Fujitsu Laboratories, Tokyo; Toshiba Corporate Research and Development Center, Tokyo, *Living with Ubiquitous Sensing and Dynamic Responsive Media*, November 29-December 2, 2010.

Presentations by Joseph A. Paradiso (cont.)

- 218) Invited talk, The Second Cisco/Intel Home Services Research Summit, Milpitas, CA, *Context, Control, and Conservation in the age of Ubiquitous Dynamic Media*, November 16, 2010.
- 219) Invited talk, Qualcomm, San Diego CA, *Interacting with Rich Dynamic Media*, October 26, 2010.
- 220) Invited talk, Nokia Research Center (NRC) Hollywood Lab, Santa Monica CA, *Interacting with Rich Dynamic Media*, October 25, 2010.
- 221) Invited talk, Future of Retailing Symposium hosted by Best Buy, Richfield MN, *Physical Retail in the Age of Ubiquity*, September 14, 2010.
- 222) Invited talk, Nokia Research Center (NRC) Cambridge UK, *Interacting with Rich Dynamic Media*, August 25, 2010.
- 223) Invited talk, Microsoft Research (MSR) Cambridge UK, *Interacting with Rich Dynamic Media*, July 22, 2010.
- 224) Invited talk, Intel My Connected Continuum (MC²) Research Workshop, Santa Clara, CA, *Interacting with Rich Dynamic Media*, July 13, 2010.
- 225) Invited talk, NIH Workshop on Personal Motion Technologies for Healthy Independent Living, NIH Headquarters, Bethesda MD, *Personal Motion Technology Project Examples*, June 23, 2010.
- 226) Invited keynote lecture, Annual CIRMMT Symposium, Montreal Canada, *Interaction in the Post-Convergence Age - From Electronic Music Controllers to Ubiquitous Dynamic Media*, May 27, 2010.
- 227) Invited talk, SRC/ATIC Forum on Minimum-Energy Electronic Systems (MEES 2020), Abu Dhabi UAE, *Body Area Sensor Platforms for Diverse Applications*, May 23, 2010.
- 228) Invited colloquium speaker, Dartmouth College, Computer Science Dept., Hanover NH, *Living with Ubiquitous Sensing & Dynamic Responsive Media*, May 12, 2010.
- 229) Invited participant, O'Reilly Foo Camp East, Microsoft New England R&D Center (NERD), Cambridge MA, April 30-May 2, 2010.
- 230) Invited talk, Printed Electronics and Photovoltaics USA 2009, San Jose, CA, *Electronic Skins, Wearable Sensing, and Ubiquitous Media - Opportunities for Flexible Electronics*, December 2, 2009.
- 231) Invited panelist and talk, ACM Sensys 2009, Berkeley CA, "Sensor Networks: The Next 10 Years," *Sensor Networks as Extension of our Nervous System*, November 5, 2009.

- 232) Invited keynote lecture, IEEE International Workshop on Multimedia Signal Processing (MMSP 2009), Rio de Janeiro, Brazil, *Linking Virtual and Real Worlds Through Ubiquitous Sensor Networks*, October 5, 2009.
- 233) Invited talk, Intuit Future of Payments Workshop, MIT Cambridge MA, “*Transactions*” in *Ubiquitous Sensing & Media Environments*, September 17, 2009.
- 234) Invited talk, NSF Workshop on Human-Environment Mobile-Based Interactions (HEMI), MIT Cambridge MA, *From Sensing People to Sensing Nature: Lessons Learned from Pervasive Computing*, September 15, 2009.
- 235) Invited keynote, The 13th International Symposium on Wearable Computing (ISWC 09), Linz, Austria, *A Decade of Exploration of Diverse Applications in Wearable Sensing*, September 5, 2009.
- 236) Invited talk, NEC Central Research Labs, Kawasaki Japan, *Wearable Wireless Sensing Platforms*, August 13, 2009.
- 237) Invited talk, LG Electronics Seocho R&D Center, *Sensor-based Interfaces and Virtual Reality*, August 11, 2009.
- 238) Invited talk, Samsung Advanced Institute of Technology (SAIT), Korea, *Beyond Mobility: Interaction, Interface, and Intention in the Age of Ubiquitous Sensing*, August 12, 2009.
- 239) Invited keynote in “Sharing Experiences 2009: Life. Context. Choices (MIT Media Lab Workshop in Seoul),” Seoul Korea, *Living with Ubiquitous Sensing and Dynamic Responsive Media*, August 10, 2009.
- 240) Invited talk and panelist at SIGGRAPH 2009, New Orleans, LA, *The Visual in New Interfaces for Musical Expression, The Visual in NIME – Some Issues in Musical Control*, August 4, 2009.
- 241) Invited workshop participant and speaker, UW/Microsoft Summer Institute 2009, Semihhmoor Resort, WA, *Wearable Dynamic Management of Distributed Domestic Utilities*, July 28, 2009.
- 242) Invited talk, IBM Almaden Research Center, San Jose CA, *Living with Ubiquitous Sensing and Dynamic Responsive Media*, July 17, 2009.
- 243) Invited colloquium speaker, EMERGE Lecture Series, New York City College of Technology, Brooklyn NY, *Sensor Networks for Linking Virtual and Real Worlds*, May 6, 2009.
- 244) Invited talk and panelist at BodyNets 2009 (BodyNets Hardware and Software Platforms Session), UCLA, *Wearable Wireless Sensing Platforms*, April 3, 2009.
- 245) Invited plenary talk, Smart Fabrics 2009, Rome Italy, *From Wearable Sensing to Sensate Media – New Substrates for Smart Environments*, March 12, 2009.

- 246) Invited talk, panelist, and juror, MIT/ML Exploring Permeable Building Event, *Permeable Buildings*, Cambridge MA, February 6, 2009.
- 247) Invited talk, IDEO Cambridge Studio, Cambridge, MA, *Sensor Networks for Linking Virtual and Real Worlds*, January 7, 2009.
- 248) Invited panelist, MIT/ILP Conference on Robots: Informing Future Design for Human-Machine Interaction, Cambridge MA, *How Can Ideas from Robotics Help Create More Intelligent “Things that Think?”*, December 2, 2008.
- 249) Invited keynote, Ambient Intelligence Conference (AMI-08), Nuremberg Germany, *Sensor Networks for Linking Virtual and Real Worlds*, November 21, 2008.
- 250) Invited keynote, FIATECH 2008 Member Meeting, Cambridge MA, *Sensor Networks for Linking Virtual and Real Worlds*, October 27, 2008.
- 251) Invited talks in Japan: NEC Central Research Labs, Kawasaki; Hitachi Central Research Laboratory (CRL), Kokubunji, Brother Industries, Nagoya; Toshiba, Kawasaki; Dai Nippon Printing (DNP) Tokyo, *Sensor Networks for Linking Virtual and Real Worlds*, September 22-26, 2008.
- 252) Invited talk, Intel Research (Roy Want Group), Santa Clara CA. *On-Body Wireless Sensing for Human-Computer Interfaces*, July 11, 2008.
- 253) Invited keynote lecture, 5th International Workshop on Wearable and Implantable Body Sensor Networks (BSN 2008), Chinese University of Hong Kong, *On-Body Wireless Sensing for Human-Computer Interfaces*, June 1, 2008.
- 254) Invited talk, Center for Design Innovation, Winston-Salem NC, *Sensor Networks for Pervasive Computing (& Musical Interfaces!)*, May 6, 2008.
- 255) Invited talk, Microsoft Research (MSR), Redmond WA, *Sensor Networks for Linking Virtual and Real Worlds*, April 30, 2008.
- 256) Invited talk, Yale University School of Architecture, “Sustainable Architecture, Today and Tomorrow: Reframing the Discourse” Symposium, New Haven, CT, *Responsive Environments*, April 5, 2008.
- 257) Invited talk, Qualcomm, San Diego, CA, *Energy Harvesting for Mobile Computing*, March 26, 2008.
- 258) Invited talk, Nokia Research Center (NRC), Palo Alto CA, *Sensor Networks for Pervasive & Wearable Applications*, January 28, 2008.
- 259) Invited talk, Tokyo Denki University, Tokyo Japan, *Sensor Nets for Wearable and Pervasive Applications - A Decade of Exploration at the MIT Media Lab*, January 21, 2008.

Presentations by Joseph A. Paradiso (cont.)

- 260) Invited corporate talks in Japan: Hitachi Research Laboratory (HRL), Oomika; NEC Central Research Laboratories, Kawasaki; Alps Electric, Sendai; KKE, Tokyo: *Sensor Networks for Pervasive & Wearable Applications*, January 15,18,22, 2008.
- 261) Invited talk, MIT Media Lab Tokyo Event, Tokyo Japan, *Sensor Networks to Augment Human Perception*, January 17, 2008.
- 262) Invited talk, Yamaha Corporation, Hamamatsu Japan, *Sensor Networks for Pervasive Computing (&Musical Interfaces!)*, July 16, 2008.
- 263) Invited talk, “Nokia World,” Amsterdam, The Netherlands, *Smart Spaces*, December 5, 2007.
- 264) Invited talk, “IEEE Workshop on Wearable Technology in Medicine” at the “Center for Connected Health 2007 Symposium,” Harvard Medical School, Boston MA, *Body Sensor Networks in Medicine, Social Computing, and the Arts*, October 23, 2007.
- 265) Invited presentation, Motorola Innovation Conference, “People and Things to Things” Session, Schaumburg, IL, *Dual Reality – A New Initiative @ the MIT Media Laboratory*, September 12, 2007.
- 266) Invited lecture, Bavaria California Technology Center (BaCaTeC) Summer School, “Pervasive Healthcare systems,” Kloster Seeon, Germany, *On-Body Sensing & Related Applications at the MIT Media Lab*, August 1, 2008.
- 267) Invited talk, Sensormatic Corporation, Boca Raton, Florida, *Recent Developments & Ongoing Projects in Sensor Networks*, July 23, 2007.
- 268) Invited talk, Agilent Corporation, Santa Clara California, *Embedded Sensing for Ubiquitous and Pervasive Computing*, July 11, 2007.
- 269) Invited panelist, *Virtual Worlds Technology & Systems Design*, session at “IBM & MIT Present Virtual Worlds: Where Business, Society, Technology & Policy Converge,” Cambridge MA, June 15, 2007.
- 270) Invited keynote, BodyNets 2007, *A Decade of Body Sensor Networks in Medicine, Sports, Entertainment & the Arts*, Florence Italy, June 11, 2007.
- 271) Invited tutorial, Pervasive 2007 (The 5th International Conference on Pervasive Computing), Toronto, Ontario, *Designing and Building Ubiquitous Sensor Systems*, May 16, 2007.
- 272) Invited keynote speaker at the NSF Workshop on “Rising To The Challenge: Integrating Social Science Into NSF Environmental Observatories Symposium,” Washington DC, *Human Sensing*, January 25, 2007.

Presentations by Joseph A. Paradiso (cont.)

- 273) Invited keynote speaker, Micro-Energy Harvesting Institute Inaugural Meeting, IMTEK (University of Freiberg, Germany), *Perspectives on Parasitic Power*, March 13, 2007.
- 274) Invited keynote speaker, T3Lab Symposium, University of Bologna, Italy, *Human-Centric Sensor Networks at the MIT Media Laboratory*, February 27, 2007.
- 275) Invited seminar, INnet08 - *Nuove Interazioni, Le Nuove Ricerche Interattive al Media Lab dell' MIT di Boston – The Responsive Environments Group*, Gallarate, Italy, February 2-3, 2007.
- 276) Invited keynote speaker at the NSF Center for Networked Embedded Sensing (CENS) Annual Meeting, UCLA, Westwood CA, *From Interactive Dancers to Digital Skins - Sensor networks at the MIT Media Lab*, October 27, 2006.
- 277) Invited talk, Power To Go - Fraunhofer Symposium Mikroenergietechnik, Berlin Germany, *International Trends in Micro Energy Technology*, October 10, 2006.
- 278) Invited talk, Motorola Energy Summit 2006, Motorola Research, Libertyville, IL, *Energy Harvesting for Mobile Computing*, September 6, 2006.
- 279) Invited keynote, 3rd IEEE-EMBS International Summer School and Symposium on Medical Devices and Biosensors, MIT Cambridge MA, *Body Sensor Networks in Medicine, Sports, and the Arts*, September 5, 2006.
- 280) Invited panelist and speaker, 2006 NDIA and ONR Naval S&T Partnership Conference, Washington DC, *Energy Sources and Power Management for Embedded Wireless Sensors*, August 2, 2006.
- 281) Invited speaker for special session “Beyond Low Power Design: Environmental Energy Harvesting,” IEEE Design Automation Conference (DAC 2006), San Francisco, CA, *Systems for Human Powered Mobile Computing*, July 26, 2006.
- 282) Invited talk, Sun Microsystems, Menlo Park, CA, *Wireless Sensing at the Frontiers of Pervasive and Social Computing*, July 25, 2006.
- 283) Invited talk, Workshop on Energy and Materials: Critical Issues for Wireless Sensor Networks, Dublin City University (DCU), *Energy Harvesting for Mobile Systems*, June 30, 2006.
- 284) Invited external speaker, Nokia Research Center Agenda 2013 and NVO Strategy Sharing event for Nokia Business and Horizontal Groups, Helsinki Finland, *Wireless Sensing at the Frontiers of Pervasive and Social Computing*, June 13, 2006.
- 285) Invited panel chair, “Applications: Beyond Dumb Data Collection,” and panelist/speaker *Some Evolving Sensor Net Applications*, EmNets 2006, Harvard University, Cambridge MA, May 31, 2006.
- 286) Invited speaker, NSTI Nanotech 2006 Conference, Boston MA, *Some Novel Applications for Wireless Inertial Sensors*, May 10, 2006.

Presentations by Joseph A. Paradiso (cont.)

- 287) Invited speaker, NEC Technology Forum, Tokyo Japan, *Wireless Sensing at the Frontiers of Pervasive and Social Computing*, March 13, 2006.
- 288) Invited speaker, Slumberger Research, Ridgefield, CT, *Embedded Sensing for Pervasive Computing*, February 28, 2006.
- 289) Invited speaker, Sensormatic/Tycho Corporation, Boca Raton, Florida, *Embedded Sensing for Pervasive Computing*, February 24, 2006.
- 290) Invited speaker, Motorola Research Media Lab Symposium, Schaumburg, IL, *Embedded Sensing for Pervasive Computing*, January 31, 2006.
- 291) Featured speaker, "Experience The Future!" Symposium, hosted by Moda Tecnologia, Milan Italy, *Sensor Technology Impacting Fashion & Retail*, January 24, 2006.
- 292) Invited participant, Second Meeting of the Nokia Academic Working group on Sensor Nets, San Diego, California – contribution: *Sensor Nets for Pervasive Computing*, November 1, 2005.
- 293) Invited talk at the 2005 Wireless Congress in Munich, Germany, *Wireless Technologies – The Future*, November 9, 2005.
- 294) Invited Talk presented at the 20 Jahre Fraunhofer IIS Symposium, Erlangen, Germany, *New Sensor Architectures for Things That Think*, July 1, 2005.
- 295) Invited Talk presented at the IEE International Seminar on Intelligent Building Environments (IBE 05), Colchester UK, *New Sensor Architectures for Responsive Environments*, May 28, 2005.
- 296) Invited talk at the National Sensor Center, Dublin City University (DCU), *Wireless Sensing for Interactive Media*, June 7, 2005.
- 297) Invited Keynote presented at the IEEE International Symposium on Collaborative Technology Systems (CTS 2005), St. Louis, MO, *Collaborative Interaction and Responsive Environments - Sensors That Enable Individuals and Instrument Multitudes*, May 19, 2005.
- 298) Invited participant in the *Nokia Workshop on Large-Scale Wireless Sensor Networks and their Applications*, Kuusamo, Finland; presentation: *Wireless Sensing for Interactive Media*, February 4-5, 2005.
- 299) Invited talk, MIT Center for eBusiness, Cambridge MA: *New Wrinkles on RFID at the MIT Media Laboratory*, November 17, 2004.
- 300) Invited talk, MIT SDM (System Design and Management) Conference on Innovative Product and System Development, Cambridge MA: *New Sensor Architectures for Responsive Environments*, October 22, 2004.
- 301) CS Colloquium, Purdue University, Advanced Computer Systems Laboratory: *New Sensor Architectures for Responsive Environments*, October 13, 2004.

Presentations by Joseph A. Paradiso (cont.)

- 302) Invited exhibition of the self-powered wireless switch at the ALPS Pavilion at the GM Techworld Exhibition, Detroit, Michigan, October 5, 2004.
- 303) Invited panelist and presenter at SIGGRAPH 2004 special session on *Computer Music*, Los Angeles, California: *New Paradigms for Musical Control*, August 10, 2004.
- 304) Invited brainstorming panelist for Caterpillar engine division, Peoria, IL, presentation: *Frontiers of Wireless Sensing*, July 7, 2004.
- 305) Invited all-day seminar at Media Lab Europe, Dublin: *Sensor Systems for Interactive Environments*, June 16, 2004.
- 306) Invited talk at the Changing Reality Workshop, Media Lab Europe, Dublin: *Embedded Sensing to Change Reality*, June 15, 2004.
- 307) Invited talk at Yamaha Research, Hamamatsu Japan: *New Paradigms for Musical Control*, June 4, 2004.
- 308) Invited talk at Brother Research, Nagoya Japan: *Sensor Architectures for Everywhere Interfaces*, June 2, 2004.
- 309) Invited talk at Ricoh Research Center, Tokyo Japan: *Sensor Architectures for Everywhere Interfaces*, June 1, 2004.
- 310) Invited talk at Fujitsu Research, Tokyo Japan: *Sensor Architectures for Everywhere Interfaces*, June 1, 2004.
- 311) Invited talk at Hitachi Research, Tokyo Japan: *Sensor Architectures for Everywhere Interfaces*, May 31, 2004.
- 312) Invited talk at Toshiba Research, Tokyo Japan: *Sensor Architectures for Everywhere Interfaces*, May 31, 2004.
- 313) Invited talk at the Acoustical Society of America's (ASA) 75'th Anniversary Meeting, New York City, *New Paradigms for Musical Control*, May 25, 2004.
- 314) Invited talk at ONE Telecommunications, Vienna, Austria: *Sensor Architectures for Everywhere Interfaces*, April 27, 2004.
- 315) Invited keynote talk at the Workshop on *Everywhere Interfaces*, hosted by the Johannes Kepler University of Linz, Austria (held in Vienna): *Sensor Architectures for Everywhere Interfaces*, April 26, 2004.
- 316) Invited talk at the TTI Vanguard *Powering the Future Workshop*, Montreal, Canada: *Energy Harvesting for Mobile Computing*, April 19, 2004.

Presentations by Joseph A. Paradiso (cont.)

- 317) Invited talk at BT Research, Adastral Park, Martlesham, Ipswich UK: *Sensor Systems for Responsive Environments*, April 8, 2004.
- 318) Invited keynote talk at the First International Workshop on Wearable and Implantable Body Sensor Networks, Imperial College, London: *Wearable Wireless Sensing for Interactive Media*, April 7, 2004.
- 319) Invited colloquium talk at the Institute for Neuroinformatics, ETH Zurich: *New Sensor Architectures for Responsive Environments*, March 5, 2004.
- 320) Invited talk at Motorola Headquarters, Sharnberg, IL: *Responsive Environments*, December 3, 2003.
- 321) Invited talk at Microsoft Research, Seattle Washington: *New Sensor Architectures for Responsive Environments*, December 2, 2003.
- 322) Invited panelist at the GM Driver/Vehicle Interaction Workshop, Detroit, Michigan, November 6, 2003.
- 323) Invited talk at the School of Engineering and Applied Science's Strategic Planning Workshop on Engineering, Humanities, and the Arts, Princeton University, Princeton NJ: *From Chaos to Convection and Tangibles to Toolkits – Interdisciplinary Perspectives from the MIT Media Lab*, November 3, 2003.
- 324) Invited talk in the *Engaging Characters* Panel hosted by the Art Interactive Gallery, Cambridge MA: *Expressive Interfaces – Examples & Directions*, October 3, 2003.
- 325) Invited presentation at the NSF Electrical and Communications Systems (ECS) Division Workshop on Wireless Networked Sensor and Actuator Systems and Grantees Meeting, UCLA, Los Angeles, CA: *Towards Sensate Media and Electronic Skins – Testbeds for Very High Density Sensor Networks*, September 8, 2003.
- 326) Invited talk at Saab Training Systems, Jonkoping, Sweden: *Sensor Technologies for Responsive Environments*, June 3, 2003
- 327) Invited keynote talk at the New Interfaces for Musical Expression (NIME 2003) Conference, McGill University, Montreal, Canada: *Expressive Interfaces – Examples & Directions*, May 22, 2003.
- 328) Invited talk at the Intel Research Lab, Seattle, Washington: *Sensate Media for Responsive Environments*, April 25, 2003.
- 329) Invited talk at Intel Research, Portland, Oregon: *Sensate Media for Responsive Environments*, April 24, 2003.
- 330) Invited talk at the *Extreme Communications* ILP event, MIT Wong Auditorium: *Communication and Sensing at the Extremities*, April 15, 2003.

Presentations by Joseph A. Paradiso (cont.)

- 331) Invited talk at the 7th Annual Festival of Art and Technology (Video, Technology, and Performance), Brown University, Providence RI: *Expressive Interfaces – Some Recent Examples*, April 5, 2003.
- 332) Invited colloquium talk at the Sonic Arts Research Center (SARC), Queens University, Belfast, Northern Ireland: *Expressive Interfaces – Some Recent Examples*, February 13, 2003.
- 333) Invited talk at the Innovating Innovation Symposium at Media Lab Europe in Dublin: *From Chaos to Convection and Tangibles to Toolkits – How Innovation Happens at the MIT Media Lab*, February 11, 2002.
- 334) Invited talk at Motorola Labs, Plantation Florida: *Sensor Technologies for Responsive Environments*, January 24, 2003.
- 335) Invited talk at the final DARPA SensIT PI Meeting: *High-Density Wireless Sensing Projects*, Waltham, MA, November 8, 2002.
- 336) CS Colloquium at Tufts University, Medford MA: *Sensor Technologies for Responsive Environments*, November 6, 2002.
- 337) Invited talk at Saabtech Systems in Stockholm, Sweden: *Sensor Technologies for Responsive Environments*, July 5, 2002.
- 338) Invited panelist at the *Managing as Designing Workshop*, Weatherhead School of Management, Case Western Reserve University, Cleveland, Ohio: *From Trash Heaps to Toolkits and Chaos to Convention – Management and Innovation at Leading Edge Design Organizations and Idea Labs*, June 14-15, 2002.
- 339) Invited talk at CCRMA (Center for Computer Research in Music and Acoustics), Stanford University: *Expressive Interfaces – Some Recent Examples*, March 11, 2002.
- 340) Invited talk at the *FreeSpace Symposium* at Duke University: *Expressive Interfaces – Some Recent Examples*, February 22, 2002.
- 341) Invited talk at the *Extreme Interfaces Symposium* at Media Lab Europe in Dublin: *Sensing at the Extremes*, January 28, 2002.
- 342) Invited talk at the EU *This is Not a Computer Workshop* at the University of Limerick in Ireland: *Disappearing Computers or Mutating Machines?*, January 24, 2002.
- 343) Invited talk at Schott Glass, Mainz, Germany: *Sensor Technologies for Responsive Environments*, August 23, 2002.
- 344) Invited talk at StatOil Research, Trondheim, Norway: *Recent Research in Responsive Environments*, June 21, 2002.

Presentations by Joseph A. Paradiso (cont.)

- 345) Invited talk at the 2002 ILP *Bringing MIT to Europe* Conference in Vienna, Austria: *Recent Research in Responsive Environments*, June 19, 2002.
- 346) Invited talk on energy storage and power harvesting for the Portable Power Group at the Gillette Advanced Technology Center in Needham MA, November 30, 2001.
- 347) Invited presentation at the *Redesigning the Future Symposium* in Tokyo: *Responsive Environments*, November 9, 2001.
- 348) Invited talk on Musical Interfaces at the American Composers Orchestra Conference, New York, NY: *Interfaces for Musical Performances and Interaction*, October 12, 2001.
- 349) Invited lecture/demonstration of the *Expressive Footwear* System, Ars Electronica Festival, Linz Austria, September 4, 2001.
- 350) Invited research seminar at the Music Technology Group, Universitat Pompeu Fabra, Barcelona Spain: *From Hypercellos to Expressive Footwear - New Musical Interfaces at the MIT Media Lab*, June 18, 2001.
- 351) Invited talk at the IBM Academy of Technology, 2001 Make IT Easy Conference, IBM Almaden Research Lab, CA: *Modern Sensor Technologies for Interactive Environments*, June 6, 2001.
- 352) Featured speaker, IEEE Signal Processing Society New England monthly meeting: *Sensor Technology and Signal Processing for Responsive Environments*, May 22, 2001.
- 353) Invited talk, MIT Industrial Liaison Program (ILP), 2001 MIT Research Director's Conference: *Wireless Applications at the MIT Media Lab*, April 19, 2001.
- 354) Invited talk at the Third Wave of Connectivity Conference, IBM Academy of Technology, IBM T.J. Watson Research Center, Yorktown Heights NY, *Challenges and applications for sensor technology in pervasive networks*, April 18, 2001.
- 355) Demonstration of *Musical Trinkets* system at the Experience Music Center, Seattle WA, April 2, 2001.
- 356) Invited Lecture/Demonstration of *Expressive Footwear* System, Boston Museum of Science, March 4, 2001.
- 357) Invited lecture/demonstration of the *Expressive Footwear* System at the ISEA 2000 Conference in Paris, France, December 10, 2000.
- 358) Invited talk, Immersive Media Group, IBM T.J. Watson Research Center, Hawthorne NY: *New Sensor Systems for Responsive Environments at the MIT Media Lab*, November 8, 2000.
- 359) Invited talk at Laboratorio di Informatica Musicale, University of Genoa, Italy, *Musical Chairs and Magic Carpets: Things That Think at the MIT Media Lab*, October 17, 2000.

- 360) Invited seminar at MediaLabEurope, Dublin: *New Sensor Systems for Responsive Environments at the MIT Media Lab*, September 18, 2000.
- 361) Invited talk at USIX usability conference, Helsinki Finland, *Musical Chairs and Magic Carpets: Things That Think at the MIT Media Lab*, September 4, 2000.
- 362) Invited *Things That Think* seminar at Westvaco Corporation Research Center, Columbia MD, August 11, 2000.
- 363) Invited talk: *Computation, Communication, and Sensing: Issues and Applications* and panelist for the Comm'n Sense: Wireless Sensor Networks session of ACM MOBICOM 2000, Boston MA, August 8, 2000.
- 364) Invited research seminar at the National Microelectronics Research Center (NMRC) in Cork, Ireland: *Musical Chairs and Magic Carpets: Things That Think at the MIT Media Lab*, July 18, 2000.
- 365) Invited demonstrations of the *Expressive Footwear* system, Discover Awards Expo, EPCOT Center, Disney World, Orlando FL, June 22-23, 2000.
- 366) Invited presentation at the DARPA Energy Harvesting Review, Washington DC, *Parasitic Power Harvesting at the MIT Media Lab*, April 13, 2000.
- 367) Invited talk (*Renewable Energy Sources for the Future of Mobile and Embedded Computing*) and panel at the Renewable Computing Session of the Intel Computing Continuum Conference, San Francisco CA, March 16, 2000.
- 368) Colloquium speaker, NASA Goddard Spaceflight Center, Greenbelt MD, *Musical Chairs and Magic Carpets: Things That Think at the MIT Media Lab*, March 6, 2000.
- 369) Invited talk (*Responsive Environments*), panel, and research demonstrations at the Human Centered Innovation Conference, Intel Research Laboratory, Portland OR, January 21, 2000.
- 370) Invited moderator of Embedded Devices and Bluetooth Technology sessions at the Bluetooth Developer's Symposium, Los Angeles CA, December 8, 1999.
- 371) Invited presentation (*Laser Tracking for Interactive Surfaces*) and demonstration of *LaserWho* installation at Opera Totale 4, Venice-Mestre, Italy, November 19, 1999.
- 372) Keynote address at the CASCON conference, hosted by IBM and the NRC (National Research Council of Canada), Toronto, Ontario, *Musical Chairs and Magic Carpets: Things That Think at the MIT Media Lab*, November 9, 1999.
- 373) Invited lecture (*From Musical Chairs to Magic Carpets: Art meets Science at the MIT Media Laboratory*) and panel at Chautauqua Seminar on High-Performance Computing and the Arts, Boston University, September 16, 1999.
- 374) Invited seminar at the Intel Research Laboratory, Jones Farm, Hillsboro OR, *Musical Chairs and Magic Carpets: Things That Think at the MIT Media Lab*, July 28, 1999.

Presentations by Joseph A. Paradiso (cont.)

- 375) Invited Presenter/participant at *Microsoft/UW Workshop on Invisible Computing*, Seattle and Semi-Ah-Moo, WA, July 19-23, 1999.
- 376) Invited talk at HP Research Laboratory, Palo Alto CA, *Musical Chairs and Magic Carpets: Things That Think at the MIT Media Lab*, June 3, 1999.
- 377) Invited seminar on musical interfaces for the Performing Arts Electrocuted Workshop, University of Limerick, Ireland, May 25, 1999.
- 378) Invited talk (*Significant Recent Developments Concerning Mobile Computing*) and panel on Pervasive Computing at ACM SIGPLAN (Federated Computing Conference), May 3, 1999.
- 379) Featured presenter at the MIT Enterprise Forum, Geneva Switzerland, *New Sensor Applications for Interactive Environments at the MIT Media Lab*, April 16, 1999.
- 380) Invited panelist (*The Future of Play*) and *Expressive Footwear* demonstrations at Tokyo Toy Fair, Tokyo Japan, March 18, 1999.
- 381) Featured speaker at the British Telecom Global Information Exchange seminar in NYC, *The Revolution in Information Infrastructure*, February 11, 1999.
- 382) Guest Lecture and *Expressive Footwear* Demonstration at Cornell University Arts Department, Ithaca NY, December 2, 1998.
- 383) Invited performance with *Expressive Footwear* at the Toshiba Wearable Computing Fashion Show, NIKOGRAPH 1998, Tokyo Japan, November 25, 1998.
- 384) Session organizer, Hardware Connectivity Roundtable at the *Things That Link Workshop*, Helsinki Finland, August 24, 1998.
- 385) Keynote address, Unisys Technology Conference, Chantilly VA, *Musical Chairs and Magic Carpets: Things That Think at the MIT Media Lab*, August 10, 1998.
- 386) Invited talk, IBM Academy Topical Conference on Pervasive Computing, IBM T.J. Watson Research Laboratory, Yorktown Heights NY, *Things That Think*, June 22, 1998.
- 387) Invited talk at IBM Almaden Research Lab, *Musical Chairs and Magic Carpets: New Sensor Applications for Interactive Environments at the MIT Media Lab*, May 15, 1998.
- 388) Invited talk at Xerox PARC, Palo Alto CA, *Musical Chairs and Magic Carpets: New Sensor Applications for Interactive Environments at the MIT Media Lab*, May 14, 1998.
- 389) Invited talk at Interval Research, Palo Alto, CA, *Musical Chairs and Magic Carpets: New Sensor Applications for Interactive Environments at the MIT Media Lab*, May 13, 1998.
- 390) Invited talk at Creative Technology Research Laboratory, Scott's Valley, CA, *Musical Chairs and Magic Carpets: New Sensor Applications for Interactive Environments at the MIT Media Lab*, May 11, 1998.

- 391) Featured presenter, IMAPS (International Microelectronics and Packaging Society) New England Annual Meeting, *Musical Chairs and Magic Carpets: New Sensor Applications for Interactive Environments at the MIT Media Lab*, December 5, 1997.
- 392) Featured seminar at the British Telecom Global Executive Forum in Southampton, UK, *The Changing Face of Technology for Information and Communications*, July 17-18, 1997.
- 393) Featured presenter at the British Telecom Global Information Exchange seminar in Southampton, UK, *The Changing Face of Technology for Information and Communications*, July 16, 1997.
- 394) Invited talk at Nortel Research, Ottawa Canada, *Musical Chairs and Magic Carpets: New Sensor Applications for Interactive Environments at the MIT Media Lab*, June 2, 1997.
- 395) Invited presentation at the XWIT (Cross-Industry Working Group on Information Technology) Wireless and Nomadic Technologies and Applications Symposium, Schaumburg IL, *Personal Area Networks and Passive Wireless Tags*, May 7, 1997.
- 396) Featured presenter at the British Telecom Global Information Exchange seminar in Cape Town, South Africa, *The Changing Face of Technology for Information and Communications*, April 30, 1997.
- 397) Featured seminar at the British Telecom Global Executive Forum in Cape Town, South Africa: *The Changing Face of Technology for Information and Communications*, April 28 and May 2, 1997.
- 398) Featured speaker at the IEEE New England Aerospace and Electronics Colloquium *Musical Chairs and Magic Carpets: Things That Think at the MIT Media Laboratory*, April 16, 1997.
- 399) Invited talk and panelist in the Computerized Live Performance Session at the 6'th Biennial Symposium on Arts and Technology, Connecticut College, New London CT, March 1, 1997.
- 400) "Hypersymposium" panel on the future of electronic musical instruments at the *Now You See It* Festival at Southbank, London, March 9, 1996.
- 401) Invited talk at the Lawrence Livermore National Laboratory, *Computers, Communication, and Entertainment; Art Meets Science at the MIT Media Laboratory*, January 12, 1996.
- 402) MIT/Draper Guidance, Navigation, and Control (GN&C) Colloquium, *A Highly Adaptable Method of Managing Jets and Aerosurfaces for Control of Aerospace Vehicles*, Spring 1990.
- 403) NASA/JSC research seminar, *A Global Approach to Attitude Control with Non-Linear Actuators*, March 22, 1990.
- 404) NASA/JSC research seminar, *Application of Search Techniques to Control of Spacecraft with Single-Gimbaled CMGs*, January 25, 1989.

Presentations by Joseph A. Paradiso (cont.)

- 405) Carnegie Mellon University, Invited Physics Dept. Lecture, *Development and Applications of the Central Detector at L3*, February 1984.
- 406) Northeastern University, Invited Physics Dept. Lecture, *Development and Applications of the Central Detector at L3*, February 1984.
- 407) MIT High-Energy Physics LNS Colloquium, *Massive μ^+ μ^- Production at the ISR*, October 1981.
- 408) Princeton University, Invited Physics Dept. Lecture, *Massive μ^+ μ^- Production at the ISR*, September 1981.
- 409) Tufts University, Invited Physics Dept. Lecture, *Massive μ^+ μ^- Production at the ISR*, September 1981.

22. Record of Research Funding for Joseph A. Paradiso

Title	Company/Entity	Dates	Amount/YR
Media Lab Consortia (MLC) ²	Industry Consortium	1/15-present	~\$6-30M/yr
Developing jam_bots: Real-Time Collaborative Agents for Live Human-AI Musical Improvisation ²	MIT Generative AI Impact Consortium (MGAIC)	6/25-5/26	\$150K
Redefining Virtuosity ²	MIT GenAI Grant	2/24-1/25	\$70K
Modernizing photovoltaic textiles for scalability and wearable applications*	MIT Portugal Program	6/23-8/24	\$120K
Scalable Virtual Substrates for Deep Real-World Engagement*	Translucia	5/23-4/25	\$150K
Sensor-Based Systems for Exploration*	National Geographic Society	10/22-present	\$20K/yr
Soft artificial intelligent tactile sensing arrays for interactive surfaces and human-robot interaction*	Amazon Science Hub	7/22-1/24	\$70K
MIT x Smart Living Lab*	MIT MISTI Switzerland Grant	7/22-1/25	\$25K
Phase III Continuation Funding: Space Health Integrated Program (SHIP) at the MIT Space Exploration Initiative*	Baylor College of Medicine	10/21-10/22	\$200K
Autonomous Robot Swarms for Lunar Orbit Servicing and Space Asset Assembly*	NASA	12/20-3/22	\$650K
Active Deployment of First Aerospace Electronic Textile*	Center for the Advancement of Science in Space (Space Station National Laboratory)	11/20	\$4.5K
Ocean Cultures*	National Geographic Society	10/20	\$10K
Space Health Integrated Program (SHIP)*	Baylor College of Medicine	10/20	\$350K
COVID-19: RAPID: Wireless Positioning for Mitigating COVID19 Surface Transmissions ²	NSF	6/20	\$100K
SpaceSkin: Aerospace Grade Electronic Textile for Hypervelocity Impact Characterization*	ULVAC-Hayashi MISTI Seed Fund (MIT)	1/20	\$24K
Tech Solutions for Fisheries*	Northrop Grumman	12/19	\$20K
MIT-Portugal Research Seeds (Oceans)*	Portuguese Science and Technology Foundation	3/19	\$90K
Digital Airflow Simulation*	Ferrero Group	1/19	\$32K

Theses Supervised by Joseph A. Paradiso

SenseTime: Mediated Atmospheres*	MIT Sensetime AI	9/18	\$100K
SIG: Mediated Atmospheres*	Bose Corporation	9/17	\$180K
SIG: Space Initiative*	Industry Consortium	8/17 – 8/20	\$237K
ML Elements - Responsive Environments*	Emerson Collective	7/17-3/21	\$331K
Low-power wireless sensor system for environmental monitoring*	EDF	1/16-1/17	\$50K
Wearable Sensory Augmentation*	Qualcomm	4/15	\$50K
CHAIN-API RESTful Sensor Framework*	EMC, Inc.	1/15-12/15	\$75K
Things That Think ^{1,2}	Industry Consortium	1/95-1/15	~\$6M/yr
Intelligent Multimodal Sensor Networks for Computing*	Cisco, Inc.	12/13	\$100K
Center for Terrestrial Sensing ²	Saudi Aramco	11/13-11/16	\$1M/yr
Glass Research Fund*	Google, Inc.	10/13	\$14K
2013 Alumni Class Fund Award ²	MIT	7/13	\$24K
Emerging Technologies in Location & Context-Aware Computing*	Intel Corp.	6/11-present	\$180K
Research in Wearable Wireless Sensing*	Nokia Corp.	6/09	\$25K
High Dynamic Range Wireless Wearable Sensing & Analysis for Athletes*	Boston Red Sox	11/07-2/10	\$170K
Towards Sensate Media and Electronic Skins: Testbeds for Very High Density Sensor Networks*	NSF	11/02-11/05	\$100K/yr
Detecting Activity in Homes with Ubiquitous Sensing to Support Aging in Place ²	NSF	7/03-7/05	\$160K/yr
Portable Gait Evaluation & Biofeedback Intervention Tool ²	CIMIT	8/01-8/02	\$25K/yr
Embedded Sensor Packs (ESP) in the Field ²	DARPA	1/99-1/01	\$1M/yr
New Sensors for Telecommunications*	Nortel Networks	1/98 - 1/01	\$125K/yr
Precision Alignment for the GEM Detector*	DOE (SSC Lab)	1/93 - 6/94	~\$150K
Fractal-based Image Processing ²	Draper Lab (IR&D)	7/89 - 7/90	~\$75K
Advanced Spacecraft Control*	NASA/JSC (RTOP)	1/89 - 1/91	~\$150K
Hybrid Control for Aerospace Vehicles*	Draper Lab (IR&D)	7/86 - 11/88	~\$150K

ROLES:

* - Principal Investigator (PI)

¹ - Co-Director, 2001-2005, 2007-2013

² - Co-PI

23. Theses Supervised by Joseph A. Paradiso

Summary			
Degree	Total	Completed	In Progress
S.B.	13	13	0
Diplom Theses			
As Advisor	2	2	0
M.Eng.			
As Advisor	23	23	0
S.M.			
As Advisor	45	43	2
As Reader	116	116	0
Ph. D.			
As Advisor	32	29	3
As Reader	45	45	0

S.B. Theses

As Advisor:

1. Ananya Nandy, "Fabrication process and electromechanical characterization of a sliding connector system for modular stretchable electronics," 6/19 (Mechanical Engineering).
2. Paele M. Powell, "Design and Fabrication of Injection-Molded and 3D-Printed Battery Clips for "Chibitronics" Circuit Sticker Workbook," 6/15 (Mechanical Engineering).
3. Ezequiel (Zeke) Schmois, "Doppel 2.0: Optimization of a Multimodal Sensor Network," 12/13 (EECS).
4. Ashley K. Turza, "Dense, Low-Power Environmental Monitoring for Smart Energy Profiling," 6/10 (Mechanical Engineering).
5. Adam N. McCaughan, "Soundscape: A Novel Instrument for Tangible and Intuitive Sound Synthesis," 8/08 (EECS).
6. Roshni Cooper, "Initial Implementation of the μ Tags Localization Transponders," 5/07 (EECS).
7. Matthew Moskwa, "A Base Station for Data Collection for Sensor-Equipped Active RFID Tags," 2/07 (EECS).
8. Cameron Lewis, "Prototyping and Expanding a Tool Set for a Ubiquitous Sensor Infrastructure," 12/06 (EECS).
9. Mateusz Malinowski, "Optical Wakeup of Micropower Tags for Object Location and Identification," 5/04 (EECS).
10. Joshua Randall, "Real-time Lighting System for Large Group Interaction," 5/02 (EECS).

11. Manu Seth, "Improvements to the Power Conditioning Circuitry for a Self-Powered Wireless Switch," 6/02 (EECS).
12. Jeffrey Y. Hayashida, "Unobtrusive Integration of Magnetic Generator Systems into Common Footwear," 6/00 (Mechanical Engineering).
13. Clyde J. Kendall, "Parasitic Power Collection in Shoe-Mounted Devices," 6/98 (Physics).

Diplom Theses

As Research Advisor:

1. Nan Zhao, "Smart Solid-State Lighting Control," 9/10 (Diplom – RWTH Aachen, Lehrstuhl Für Medizinische Informationstechnik).
2. Clemens Satzger, "Fusion of Six-Dimensional Sensor Data Using Physics Engines," 1/10 (Diplom – TU München, Institute for Media Technology).

M.Eng. Theses

As Advisor:

1. Benton B. Wilson, "LightShow: Abstract Representations of Music Lighting in Python," 9/22 (EECS).
2. Anthony Roman, "Interactive Audience-Controlled Live Storytelling Technologies," 5/22 (EECS).
3. Evan Lynch, "SensorChimes: Musical Mapping for Sensor Networks toward Augmented Acoustic Ecosystems," 2/16 (EECS).
4. David Way, "EMGRIE: Ergonomic Microgesture Recognition and Interaction Evaluation, A Case Study," 1/14 (EECS).
5. Nicholas D. Joliat, "DoppelLab: Spatialized Data Sonification in a 3D Virtual Environment," 2/13 (EECS).
6. Rachel M. Bainbridge, "HCI Gesture Tracking Using Wearable Passive Tags," 9/10 (EECS).
7. Berham F.T. Mistree, "A Flexible High-Density Sensor Network," 9/08 (EECS).
8. Robert N. Jacobs, "A Wireless Sensor-based Mobile Music Environment Compiled from a Graphical Language," 9/07 (EECS).
9. Mateusz K. Malinowski, "Micropower Active Tags for Shipment Monitoring and Identification," 2/07 (EECS).
10. Daniel Sang Kim, "Sensor Network Localization Based on Natural Phenomena," 8/06 (EECS).
11. Michael J. Broxton, "Localization and Sensing Applications in the Pushpin Computing Network," 2/05 (EECS).
12. Stephen D. Lovell, "A System for Real-Time Gesture Recognition and Classification of Coordinated Motion," 1/05 (EEES).
13. Che King Leo, "Contact and Free-Gesture Tracking for Large Interactive Surfaces," 6/02 (EECS).

14. Laurel P. Smith, "Development of an Improved Swept RF Tagging System and its Musical Applications," 1/02 (EECS).
15. Leila M. Hasan, "Visual Frets for a Free-Gesture Musical Interface," 6/01 (EECS).
16. Nisha Checka, "A System for Tracking and Characterizing Acoustic Impacts on Large Interactive Surfaces," 5/01 (EECS).
17. Zoe C. Teegarden, "Embedded Low-Power Wireless Sensor System: Design of a Software Radio Base Station," 4/01 (EECS).
18. Christopher T. Yang, "New Laser Range Finder Designs For Tracking Hands Atop Large Interactive Surfaces," 3/01 (EECS).
19. Kai-Yuh E. Hsiao, "Fast Multi-Axis Tracking of Magnetically Resonant Passive Tags: Methods and Applications," 2/01 (EECS).
20. Ara N. Knaian, "A Wireless Sensor Network for Smart Roadbeds and Intelligent Transportation Systems," 6/00 (EECS).
21. Phillip J. Rowe, "Characterization of a Wideband Monopulse Piezoelectric Direction Finder," 6/99 (EECS).
22. Eric Hu, "Applications of Expressive Footwear," 4/99 (EECS).
23. Joshua Strickon, "Design and HCI Applications of a Low-Cost Scanning Laser Rangefinder," 1/99 (EECS).

S.M. Theses

As Advisor:

1. Perry Naseck, "Systems of Visualization for Musical Futures," expected 9/25 (MAS).
2. Nathan Perry, "Interstice: firmware-extensible pervasive embedded networks," expected 5/25 (MAS).
3. Samantha Chin, "Towards Perceptual Augmentation," 9/24 (MAS).
4. Severin Meyer, "Design and Control of Intelligent Electromagnetic Footwear for Space Applications," 8/24 (ETH Zürich).
5. Fangzheng Liu, "LunarWSN: A Wireless Sensor Network for In-Situ Lunar Water Ice Detection," 9/21 (MAS).
6. Jonathan Michael Feldman, "The Augmented Geometrically Spaced Transform: Applications of the Single Channel Frequency Estimator," 1/21 (MAS).
7. Elena Chong Loo Kodama, "R.E.I.N.A. Towards Pervasive Interface Agents that Transcend the Physical-Digital Worlds," 9/20 (MAS).
8. Patrick Chwalek, "Captivates: A Smart Eyewear Platform for Ambulatory Physiological Measurement Capture," 9/20 (MAS).
9. Océane Elia Boulais, "Emerging Computational Methodologies for Transparency in Fisheries," 9/20 (MAS).
10. Charlene Xia, "A low-cost modular underwater acoustic communication system," 9/20 (MAS).
11. Junsu Jang, "Marine snow tracking stereo imaging system," 9/20 (MAS).

12. Tyler J. Schoeppner, "Large Interactive Laser Light-Field Installation (LILLI)," 9/20 (MAS).
13. Carlos Nunez Lopez, "A modular and stretchable electronic system for on-body health monitoring applications," 9/19 (MAS).
14. Ezinne Uzo-Okoro, "Characterization of On-Orbit Robotic Assembly of Small Satellites," 5/20 (MAS).
15. Don Derek Haddad, "Resynthesizing Reality: Driving Vivid Virtual Environments from Sensor Networks," 2/18 (MAS).
16. Sara Ramsen, "Visualizing Models Driven by Real-Time, Sensor-Based Data: A New Way to Experience the Inner Workings of Ecosystems," 6/17 (MIT IDM Program).
17. Irmandy Wicaksono, "Design and Implementation of Multi-sensory Fabric for Deformable Musical Interface," 12/16 (EE Dept., ETH Zurich).
18. Daniel Manesh, "Exquisite Score – A System for Collaborative Musical Composition," 6/16 (MIT EECS).
19. David Ramsay, "LearnAir: Toward Intelligent, Personal Air Quality Monitoring," 8/16 (MAS).
20. Asaph Azaria, "Intelligent Ambiance: Digitally mediated workspace atmosphere, augmenting experiences, and supporting wellbeing," 8/16 (MAS).
21. Juliana Cherston, "Auditory Display For Maximizing Engagement and Attentive Capacity," 8/16 (MAS)
22. Vasant Ramasubramanian, "QuadraSense: Immersive UAV-based Cross-Reality Navigation of Environmental Sensor Networks," 8/15 (MAS).
23. Spencer Russell, "Auditory Augmented Reality in Expansive Spaces," 8/15 (MAS).
24. Pragun Goyal, "CAD Enabling Smart Handtools," 5/14 (MAS).
25. Sara Pfenninger, "A People-Tracking System Utilizing Particle Filters in a Non-Overlapping Sensor Network," 10/13 (EE Dept., ETH Zurich).
26. Brian D. Mayton, "WristQue: A Personal Sensor Wristband for Smart Infrastructure and Control," 2/13 (MAS).
27. Gershon Dublon, "Beyond the Lens: Communicating Context through Sensing, Video and Visualization," 9/11 (MAS).
28. Laurel S. Pardue, "Expressive Re-Performance," 9/11 (MAS).
29. Alexander J. Reben, "Interactive Physical Agents for Story Gathering," 6/10 (MAS).
30. Matthew Aldrich, "Dynamic Solid State Lighting," 6/10, (MAS).
31. Nan-Wei Gong, "Configurable Dynamic Privacy for Pervasive Sensor Networks," 9/09 (MAS).
32. Michael T. Lapinski, "A Wearable, Wireless Sensor System for Sports Medicine," 9/08 (MAS).
33. Manas Mittal, "Ubicorder: A Mobile Interface to Sensor Networks," 9/08 (MAS).
34. Jason M. LaPenta, "Real-time 3-d Localization using Radar and Passive Surface Acoustic Wave Transponders," 8/07 (MAS).

35. Ryan P. Aylward, "Senseble: A Wireless Inertial Sensor System for Interactive Dance and Collective Motion Analysis," 9/06 (MAS).
36. Gerardo Barroeta Pérez, "S.N.A.K.E.: A Dynamically Reconfigurable Artificial Sensate Skin," 9/06 (MAS).
37. Mathew J. Laibowitz, "Parasitic Mobility for Sensate Media," 8/04 (MAS).
38. David J. Merrill, "FlexiGesture: An sensor-rich real-time adaptive gesture and affordance learning platform for electronic music control," 6/04 (MAS).
39. Hongshen Ma, "Capacitive Displacement Sensing for the Nanogate," 2/04 (MAS).
40. Mark C. Feldmeier, "Large Group Musical Interaction using Disposable Wireless Motion Sensors," 9/02 (MAS).
41. Joshua H. Lifton, "A Platform for Distributed Embedded Ubiquitous Computing," 9/02, (MAS).
42. Ari Y. Benbasat, "Design of a Compact Inertial Measurement Unit and an Associated Analysis, Gesture Recognition and User Feedback Framework," 9/00 (MAS).
43. Ari T. Adler, "A Cost-Effective Portable Telemedicine Kit for Use in Developing Countries," 6/00 (Mechanical Engineering).
44. Nathan Shenck, "A Demonstration of Useful Electric Energy Generation from Piezoceramics in a Shoe," 5/99 (EECS).
45. Nazareth Sarkis Bedrossian, "Steering Law Design for Redundant Single Gimbaled Control Moment Gyro Systems," 8/87 (MIT Mechanical Engineering).

S.M. Theses

As Reader:

1. Lin, Tsung-Han, "Multi-bounce Returns for Specular Surface Mapping from Consumer-grade Flash LiDAR," 9/24 (MAS).
2. Kyuho Jang, "CircTrack: wearable real-time circulating cell monitoring device," 6/24 (MAS).
3. Maxwell K. Addae, "VocalCords: Exploring Tactile Interaction and Performance with the Singing Voice," 9/23.
4. Junqing Qiao, "EMG methods for prosthesis ankle-subtalar free-space control," 2/23 (MAS).
5. Waleed Akbar, "Battery-Free Wireless Imaging of Underwater Environments," 9/22 (MAS).
6. Justin Browning Christensen, "Distributed Displays for Discrete Integrated Circuit Electronics," 9/21 (MAS).
7. Christina Meyer, "Design and Efficacy of a Variable Thickness Transtibial Prosthetic Liner," 9/21 (MAS).
8. Zach Fredin, "Assembling Integrated Electronics," 9/21 (MAS).
9. Sohan Savio Dsouza, "Crowdsourcing Moral Psychology," 2/21 (MAS).

10. Manushaqe Muco, "Connecting Symbols to Primitive Percepts using Expectation as Feedback," 9/20 (MAS).
11. Ravi Tejwani, "Migratable AI," 9/20 (MAS).
12. Nikhil Singh, "Sifting Sound: Interactive Extraction, Exploration, and Expressive Recombination of Large and Heterogeneous Audio Collections," 9/20 (MAS).
13. Abhinandan Jain, "Body Driven Cognition: Writing To The Body To Influence the Mind," 9/20 (MAS).
14. Junshan Leng, "RF-Guided Exploration for Robotic Manipulation," 9/20 (MAS).
15. João Henrique Santos Wilbert, "Vibroacoustic Materials: Leveraging Material Vibration to Sense Interaction," 9/20 (MAS).
16. Tomohiro Maeda, "Computational Imaging with Scattered Photons to See inside the Body," 6/20 (MAS).
17. Tomás Alfonso Vega Gálvez, "μJawstures: Jaw-teeth microgestures for discreet hands-and-eyes-free mobile device interaction," 9/19 (MAS).
18. Seong Ho Yeon, "Design of an advanced sEMG processor for wearable robotics applications," 8/19 (MAS).
19. Britney Johnson, "Kicks x Cliques: Exploring the Intersection of Sneaker Culture and Mental Health in the Black Community," 8/19 (MAS).
20. Zhihong Luo, "3D Backscatter Localization for Fine-Grained Robotics," 6/19 (MAS).
21. Hane Lee, "Freedom Simulator," 6/19 (MAS).
22. Jiamin Sun, "Human Intent Prediction for Adaptive Lighting Based on a Limited Data Scenario," 2/19 (MIT Architecture and EECS).
23. Ali Shtarbanov, "AirTap: A Multimodal Interactive Interface Platform with Free-Space Cutaneous Haptic Feedback via Toroidal Air-Vortices," 2/18 (MAS).
24. Levi Cai, "On-site Autonomous Fabrication at Architectural Scales," 6/18 (MAS).
25. Pedro Antonio Colón-Hernández, "Hover: A wearable object identification system for audio augmented reality interactions," 6/18 (MAS).
26. Thomas Sanchez Lengeling, "Panoptic," 9/17 (MAS).
27. Penny Webb, "Chemical Inflation for Assisted Assembly," 9/17 (MAS).
28. Nicole L'Huillier, "Spaces That Perform Themselves," 8/17 (MAS).
29. Daniel John Fitzgerald, "Spatial Material Interfaces," 6/17 (MAS).
30. Brian Tice, "Sonic Artifacts," 6/17 (MAS).
31. Caroline Jaffe, "Motivating urban cycling through a blockchain-based financial incentives system," 6/17 (MAS).
32. Ariel C. Ekblaw, "MedRec: Blockchain for Medical Data Access, Permission Management and Trend Analysis," 2/17 (MAS).
33. Luke Vink, "Materiality in 'Suspense'," 8/16 (MAS).
34. Tal Achituv, "Assisted Self-Expression in Paint," 5/16 (MAS).

35. Sarah Platte, "The Maestro Myth – Exploring the Impact of Conducting Gestures on the Musician's Body and the Sounding Result," 5/16 (MAS).
36. Cameron Taylor, "Transverse Flux Motor Optimization for Utilization in Bionic Joints," 5/16 (MAS).
37. Tome Basheer, "Exoskin: Pneumatically Augmenting Inelastic Materials for Texture Changing Interfaces," 9/15 (MAS).
38. Jean-Francois Duval, "FlexSEA : flexible, scalable electronics architecture for wearable robotic applications," 5/15 (MAS).
39. Guy Satat, "Imaging Through Scattering," 5/15 (MAS).
40. Felix Heibeck, "Augmented Material Interfaces: Exploring bidirectional microinteractions enabled by radical elements," 5/15 (MAS).
41. Charles Holbrow, "Hypercompression: Stochastic Musical Processing," 5/15 (MAS).
42. Daniel Goodman, "Aware surfaces: large-scale, surface-based sensing for new modes of data collection, analysis, and human interaction," 5/15 (MAS).
43. Kamal Farah, "Soft Exchange: Interaction Design with Biological Interfaces," 5/15 (MAS).
44. Benjamin A. Bloomberg, "Hyperproduction: An Audio-Centric Framework For The Abstract Modeling Of Live Performance To Guide Audience Attention And Perspective Using Connected Real-Time Systems," 8/14 (MAS).
45. William K. Langford, "Electronic Digital Materials," 9/14 (MAS).
46. Jared Laucks, "Custom Mechanisms for Tunable Material Deposition," 6/14 (MAS).
47. Robert Michael Hemsley, "Flow: A Framework for Reality-Based Interfaces," 2/14 (MAS).
48. Kshitij Marwah, "Tensor Photography: Exploring Space of 4D Modulations Inside Traditional Camera Designs," 9/13 (MAS).
49. Samuel Jacoby, "Drawing the Electric," 6/13 (MAS).
50. Nikhil Naik, "Multibounce Light Transport Analysis using Ultrafast Imaging for Material Acquisition," 5/12 (MAS).
51. Praveen Subramani, "taking charge: Optimizing Urban Charging Infrastructure for Shared Electric Vehicles," 9/12 (MAS).
52. Andrew Matthew Bardagjy, "Low dimensionality spectral sensing for low cost material discrimination and identification," 5/12 (MAS).
53. Akito van Troyer, "Hyperaudience Designing Performance Systems for Audience Inclusion," 8/12 (MAS).
54. David Allen Hill, "Effects of a Powered Ankle Prosthesis on Shock Absorption and Residual Limb/Socket Interface Pressure," 6/12 (MAS).
55. Nikhil Naik, "Multibounce Light Transport Analysis using Ultrafast Imaging for Material Acquisition," 5/12 (MAS).
56. David Cranor, "ProtoTouch: A System For Prototyping Ubiquitous Computing Environments Mediated By Touch," 9/11 (MAS).

57. Matthew Donahoe, "OnTheRun: A Location-based Exercise Game," 9/11 (MAS).
58. Roarke Horstmeyer, "Towards a Unified Treatment of 3D Display using Partially Coherent Light," 9/11 (MAS).
59. Jinha Lee, "ZeroN: Mid-Air Tangible Interaction Enabled by Computer Controlled Magnetic Levitation," 2/11 (MAS).
60. Natan Linder, "LuminAR: A Compact and Kinetic Projected Augmented Reality Interface," 9/11 (MAS).
61. David Y. Robert, "Imaginative Play with Blended Reality Characters," 6/11 (MAS).
62. Edward (Ned) E. Burns, "End-User Modification and Correction of Home Activity Recognition," 9/10 (MIT Architecture Dept.).
63. Andrea Colaço, "Back Talk: An Auditory Environment for Remote Co-Presence in Television Viewing," 9/10 (MAS).
64. Sheng-Ying Pao, "Connected Strangers: Manipulating Social Perceptions To Study Trust," 5/10 (MAS).
65. Andrew A. Cavatora, "Nervebox: The First General Platform for Electromechanical Musical Instruments," 6/10 (MAS).
66. Noah Feehan, "Syncwalk - A Framework for Geospatial Audio Composition," 6/10 (MAS).
67. Elly N. Jessop, "A Gestural Media Framework: Tools for Expressive Gesture Recognition and Mapping in Rehearsal and Performance," 6/10 (MAS).
68. Sigurður ÖrnAdalgeirsson, "MeBot: A Robotic Platform for Socially Embodied Telepresence," 9/09 (MAS).
69. Matthew W. Hirsch, "BiDi Screen: Depth and Lighting Aware Interactive Display," 9/09 (MAS).
70. Ana Luisa Santos, "uCom: Spatial Displays for Visual Awareness of Remote Locations," 9/09 (MAS).
71. Amit Zoran, "Chameleon Guitar: Physical Heart in a Digital Instrument," 6/09 (MAS).
72. Matthew T. Farrell, "Angular momentum in turns and abrupt starts : strategies for bipedal balance control," 6/09 (MAS).
73. Jun K. Lee, "Affordable Avatar Control System for Personal Robots," 2/09 (MAS).
74. Sanghoon Lee, "Infocfield: An Aura Recognizing Digital Information of Everyday Environments," 2/09 (MAS).
75. Marcelo Coelho, "Materials of Interaction," 9/08 (MAS).
76. Brandon T. Taylor, "Graspables: Grasp Recognition as a User Interface," 9/08 (MAS).
77. Avrum Douglas Hollinger, "Design of fMRI-Compatible Electronic Musical Interfaces," 9/08, (McGill University, Department of Music).
78. Benjamin Aisen, "An Inertial Measurement-Based Gait Detection System for Active Leg Prostheses," 9/07 (MAS).
79. Steven Pliam, "The Chandelier: Toward a Digitally Conceived Physical Performance Object," 9/07 (MAS).

80. Arnan Sipitakiat, "Giving the head a hand : constructing a microworld to build relationships with ideas in balance control," 9/07 (MAS).
81. Daniel O. Olguin, "Sociometric Badges: Wearable Technology for Measuring Human Behavior," 6/07 (MAS).
82. Michael A. Fabio, "The Chandelier: An Exploration in Robotic Musical Instrument Design," 6/07 (MAS).
83. Patrik Künzler, "Humanseat: semi-wearable seating concepts for vehicle control, medical, and wellbeing applications," 6/07 (MAS).
84. Wen Dong, "Influence Modeling of Complex Stochastic Processes," 9/06 (MAS).
85. Bo Morgan, "Learning Commonsense Human-language Descriptions from Temporal and Spatial Sensor-network Data," 9/06 (MAS).
86. Enrico Costanza, "Subtle, Intimate Interfaces for Mobile Human Computer Interaction," 9/06 (MAS).
87. Ernesto Carlos Martinez Villalpando, "Estimation of Ground Reaction Force and Zero Moment Point on a Powered Ankle-Foot Prosthesis," 9/06 (MAS).
88. Sajid H. Sadi, "subTextile: A Construction Kit for Behavioral Textiles," 9/06 (MAS).
89. Gauri Nanda, "Accessorizing with Networks: The Possibilities of Building with Computational Textiles," 9/05 (MAS)
90. David Sachs, "A Forearm Controller and Tactile Display," 9/05 (MAS).
91. John Harrison, "SoundBlocks and SoundScratch: Tangible and Virtual Digital Sound Programming and Manipulation for Children," 9/05 (MAS).
92. Simon Karl Josef Schiessl, "Acoustic Chase: Designing an interactive audio environment to simulate human body movement," 6/04 (MAS).
93. Walter Daniel Stiehl, "Sensitive Skins and Somatic Processing for Affective and Sociable Robots based upon a Somatic Alphabet Approach," 5/05 (MAS).
94. Akshay Mohan, "Health Technology: Design of Bandage-Sized Wireless Sensors and Effect of Ambient Displays on Social Support and Diabetes Management," 9/04 (MAS).
95. Gian Pangaro, "The Actuated Workbench," 6/03 (MAS).
96. Simon Greenwold, "Spatial Computing," 5/03 (MAS).
97. Emmanuel Munguia Tapia, "Activity Recognition in the Home Setting Using Simple and Ubiquitous Sensors," 9/03 (MAS).
98. Megan Galbriath, "Embedded Systems for Computational Garment Design," 6/03 (MAS).
99. Parul Vora, "SIMULACRUM: Situated Memory for Architectural Space," 8/03 (MAS).
100. Deva Seetharamakrishnan, "C@T – A Language for Programming Massively Distributed Systems," 9/02 (MAS).
101. Roberto Mario Aimi, "New Expressive Percussion Instrument," 9/02 (MAS).
102. Nikita Pashenkov, "Optical Turntable as an Interface for Musical Performance," 5/02 (MAS).

103. Jorge Martinez Arazia, "Wireless transmission of power for sensors in context aware spaces," 6/02 (MAS).
104. Joshua Weaver, "A wearable health monitor to aid Parkinson Disease treatment," 6/03 (MAS).
105. Ricardo Garcia, "Automatic Generation of Sound Synthesis Techniques," 9/01 (MAS).
106. Diana Young, "New Frontiers of Expression Through Real-Time Dynamics Measurement of Violin Bows," 9/01 (MAS).
107. Tristan Jehan, "Perceptual Synthesis Engine: An Audio-Driven Timbre Generator," 9/01.
108. Wei Chai, "Melody Retrieval on the Web," 9/01 (MAS).
109. Wendy G. Ju, "The Design of Active Workspaces," 9/01 (MAS).
110. Jay-Chol Lee, "HandSCAPE: A Design of a Computational Measuring System," 6/01 (MAS).
111. Daniel J. Overhault, "The Emonator: A Novel Musical Interface," 9/00 (MAS).
112. Edward V. Hammond, "Multi-Modal-Mixing," 6/00 (MAS).
113. Matthew V. Lau. "The Snap! Toolkit: A Model for Pluggable Monitoring," 6/00 (MAS).
114. Craig A. Wisneski, "The Design of Personal Ambient Displays," 6/99 (MAS).
115. Tom White, "Introducing Liquid Haptics in High Bandwidth Human Computer Interface," 1/98 (MAS).
116. Andrew Choon-ki Hong, "Non-Linear Analysis of Cello Pitch and Timbre," 9/92 (MAS).

Doctoral Theses

As Advisor:

1. Madelyn Hoying, "Detecting Tight Junction-Mediated Epithelial Barrier Dysfunction in Altered Gravity Environments," Expected Fall 2025 (MIT HST Program).
2. Patrick Chwalek, "From Humans to Canids to Bees: Cross-Contextual Exploration in Environmental Sensing and Ecological Research," Expected 9/25 (MAS).
3. Ali Shtarbanov, "Modular Development Platforms and Creative Ecosystems: Design & Deployment for Wide Impact Across Fields," Expected 5/25 (MAS).
4. Irmandy Wicacksono, "Textile Macroelectronics: Architecting Sensate and Computational Fabrics across Scales," 9/24 (MAS).
6. Don Derek Haddad, "Responsive Space Environments: New Paradigms in Blending Virtual and Physical Exploration through Human-Robot Operations," 9/23 (MAS).
7. David Bradford Ramsay, "Designing for Deep Engagement," 9/23 (MAS).
8. Deborah Anne Najjar, "CRISPR Biosensors for Resource-limited Nucleic Acid Detection," 9/22 (MAS).
9. Juliana Mae Cherston, "The Well-Dressed Spacecraft: Textiles for Cosmic Dust Metrology," 9/22 (MAS).
10. Caroline Adair Jaffee, "An Environmental and Economic Systems Analysis of Land Use Decisions in the Massachusetts Cranberry Industry," 9/22 (MAS).

11. Ishwarya Ananthabhotla, "Cognitive Audio: Enabling Auditory Interfaces with an Understanding of How We Hear," 2/22 (MAS).
12. Ariel Ekblaw, "Self-Aware Self-Assembly for Space Architecture: Growth Paradigms for In-Space Manufacturing," 9/20 (MAS).
13. Brian D. Mayton, "Sensor Networks for Experience and Ecology," September 2020 (MAS).
14. Spencer Russell, "Resynthesizing Volumetric Soundscapes: low-rank subspace methods for soundfield estimation and reconstruction," May 2020 (MAS).
15. Artem Dementyev, "Dynamic wearable technology: designing and deploying small climbing robots for sensing and actuation on the human body," 9/19 (MAS).
16. Gershon Dublon, "Sensor(y) Landscapes: Technologies for New Perceptual Sensibilities," 6/18 (MAS).
17. Nan Zhao, "Mediated Atmospheres Context-aware Adaptive Lighting and Multimodal Media Environments," 9/17 (MAS).
18. Jie Qi, "Paper Curiosities: Circuits on Paper for Learning and Self-Expression," 8/16 (MAS)
19. Nan-Wei Gong, "Design and Applications of Inkjet-Printed Flexible Sensate Surfaces," 8/13 (MAS).
20. Michael T. Lapinski, "A Platform for High-Speed Biomechanical Data Analysis using Wearable Wireless Sensors," 8/13 (MAS).
21. Amit Zoran, "Hybrid re-Assemblage: Bridging Traditional Craft and Digital Design," 8/13 (MAS).
22. Bo Morgan, "A Substrate for Accountable Layered Systems," 8/13 (MAS).
23. Mathew Laibowitz, "Creating Cohesive Video with the Narrative-Informed use of Ubiquitous Wearable and Imaging Sensor Networks," 1/10 (MAS).
24. Mark C. Feldmeier, "Personalized Building Comfort Control," 9/09 (MAS).
25. Joshua H. Lifton, "Dual Reality: An Emerging Medium," 9/07 (MAS).
26. Ari Y. Benbasat, "Techniques for Real-time Adaptive Low-Power Sensor Systems," February 2007 (MAS).
27. Stacy J Morris, "A Shoe-Integrated Sensor System for Wireless Gait Analysis and Real-Time Therapeutic Feedback," June 2004 (MIT Mechanical Engineering - HST).
28. John Edward Dzielski, "A Feedback Linearization Approach to Spacecraft Control Using Momentum Exchange Devices," April 1988 (MIT Mechanical Engineering).

Doctoral Theses

As Reader:

1. Ferrous Ward, "Enhancing Space Exploration Missions with Virtual Reality: Decision support for Mission Operations and Planetary Science," 5/24 (MIT Aero/Astro).
2. Seong Ho Yeon, "Enhancing Muscle Sensing Modalities for Advanced Bionics," 5/24 (PhD).

3. Akshay Kothakonda, "Engineering Mechanical Counter Pressure Spacesuits and Compression Garments: Active Pressurization and Design for Mobility," 2/24 (MIT Aero/Astro).
4. Cody Alison Paige, "Enabling a permanent human presence beyond low Earth orbit: wearable radiation protection and enhanced science through virtual reality," 9/23 (MIT Aero/Astro).
5. Nicolas Alexander Lee, "Endless Ecosystems: Designing a World Without Waste," 6/23 (MAS).
6. Guillermo Román Bernal Cubias, "Into the Wild: Deploying Brain and Physiological Sensing in Natural Environments to Enhance Wake and Sleep Cognitive Behavioral Studies," 5/23 (MAS).
7. Nivedita Arora, "Sustainable Interactive Wireless Stickers - From Materials to Devices to Applications," 1/23 (Georgia Tech, CS Department).
8. Michael Haslgrübler, "Skill Interpretation for Industrial Production," 9/22 (Johannes Kepler Universität [JKU], Linz Austria, Informatik [CS] Department).
9. Ken Nakagaki, "Shells and Stages for Actuated TUIs: Reconfiguring and Orchestrating Dynamic Physical Interaction," 9/21 (MAS).
10. Aswin Karthik Ramachandran Venkatapathy, "An Approach towards Decentralization of Systems Communication in Industry 4.0," 5/21 (TU Dortmund [Germany], Mechanical Engineering Dept.).
11. Youngbin Sun, "Enhancing Internet of Things Experience in Augmented Reality Environments," 5/20 (MIT Mechanical Engineering).
12. Benjamin Arthur Philips Bloomberg, "Making Musical Magic Live: Inventing modern production technology for human-centric music performance," 2/20 (MAS).
13. Matthew Everett Lawson, "Biologically encoded augmented reality: multiplexing perceptual bandwidths," 9/20 (MAS).
14. Cameron Roy Taylor, "Magnetomicrometry : tissue length tracking via implanted magnetic beads," 5/20 (MAS).
15. Sang-won Leigh, "Robotic Symbionts: Exploring Integrated Human-Machine Action and Expression," 9/18 (MAS).
16. Guy Satat, "All Photons Imaging – Time-Resolved Computational Imaging Through Scattering," 2/18 (MAS).
17. Markus Kayser, "Towards Swarm-based Design: Distributed and Materially-tunable Digital Fabrication Across Scales," 2/18 (MAS).
18. Natan Linder "Rapid Development and Real World Deployments of Projected Augmented Reality Applications," 9/17 (MAS).
19. Akito van Troyer, "Score Instruments: Interaction Design for Abstract Musical Decision Making," 9/16 (MAS).
20. Jacob Bernstein, "Scalable Neural Recording: Electrophysiology System Development and Validation," 8/16 (MAS).
21. Clément Duhart, "Toward Organic Ambient Intelligences – EMMA," 6/16 (Normandie Université [l'Université du Havre], France).

22. Arthur Joseph Petron, "Prosthetic socket design : from a multi-indenter device for in vivo biomechanical tissue measurement to a quasi-passive transtibial socket interface," 2/16 (MAS).
23. Roy Shilkrot, "Digital digits: Designing Assistive Augmentation Devices," 6/15 (MAS).
24. Sean Follmer, "Dynamic Physical Affordances for Shape Changing and Deformable User Interfaces," 1/15 (MAS).
25. Santiago E.A. Bernate, "Digital Synesthesia: Using Mobile Technology to Interact With Our World," 1/15 (MAS).
26. Andrea Colaço, "Compact and Low-Power Computational 3D Sensors for Gestural Input," 6/14 (MAS).
27. Andrew O. Payne, "Personalized Intelligent Comfort Control for Office Spaces," 5/14 (Harvard Graduate School of Design).
28. Wu-Hsi Li, "Loco-Radio - Designing High-Density Augmented Reality Audio Browsers," 2/14 (MAS).
29. Matthew T. Farrell, "Pattern Classification of Terrain During Amputee Walking," 5/13 (MAS).
30. Noah Vawter, "Exertion Instruments," 6/11 (MAS).
31. Fulu Li, "Community Computation," 6/09 (MAS).
32. David J. Merrill, "Interaction with Embodied Media," 6/09 (MAS).
33. Emmanuel Munguia Tapia, "Using Machine Learning for Real-Time Activity Recognition and Estimation of Energy Expenditure," 6/08 (MAS).
34. Eric Wade, "Analysis and Design of a Wearable Health-Monitoring Network using DC Powerline Communication and Conductive Textiles," 1/07 (MIT Mechanical Engineering Department).
35. Diana Young, "A System for Understanding Violin Bowing Technique Through Measurement of Physical Dynamics", 1/07 (MAS).
36. Roberto Aimi, "Not another controller: hybrid percussion instruments using real acoustic systems to drive digital ones," 10/06 (MAS).
37. Dean Christakos, "Distributed-in/Distribution-out Sensor Networks: A New Framework to Analyze Distributed Phenomena," 2/06 (MAS)
38. Ali Mazalek, "Media Tables: An extensible method for developing multi-user media interaction platforms for shared spaces," 9/05 (MAS).
39. Aggelos Bletsas, "Intelligent Antenna Sharing in Cooperative Diversity Wireless Networks," 6/05 (MAS).
40. Susan Baldwin, "Development of Low Cost, Low Power Optical Sensing Devices Based on Coupled LED's for Colorimetric Analysis," 6/05 (Chemistry Dept., Dublin City University).
41. Kynan Eng, "Designing Neuromorphic Interactive Spaces, 6/04 (ETH Zürich, EE Dept.).
42. Gil Weinburg, "Interconnected Musical Networks - Bringing Expression and Thoughtfulness to Collaborative Group Playing," 8/03 (MAS).

43. Ernest Rehmi Post, "Inertial Measurement via Dynamics of Trapped Particles," 8/03 (MAS).
44. Dorothy Shamonsky, "The Mixing of Two Worlds -- Smart Clay -- Using Ubiquitous Computing to Add Intelligence to a Physical Medium," 6/03 (MIT Architecture)
45. Mathew Reynolds, "Low-Frequency Indoor Radiolocation," February 2/03 (MAS).
46. Brian Clarkson, "Life Patterns: structure from wearable sensors," 9/02 (MAS).
47. Gregory Errol Chamitoff, "Robust Intelligent Flight Control for Hypersonic Vehicles," 2/92 (MIT Aero/Astro)