Fukushima Audio Census

Hiroki Kobayashi

Center for Spatial Information
Science, The University of
Tokyo, Chiba, Japan
kobayashi@csis.u-tokyo.ac.jp

Hiromi Kudo

Center for Spatial Information
Science, The University of
Tokyo, Chiba, Japan
kudo3@csis.u-tokyo.ac.jp

Vicki Moulder

Center for Spatial Information
Science, The University of
Tokyo, Chiba, Japan
vmoulder@csis.u-tokyo.ac.jp

Michael Heidt

crossWorlds, Chemnitz
University of Technology,
Chemnitz, Saxony, Germany
michael.heidt@differentway.de

Lorna Boschman

CEO, Digital Stories.ca Vancouver,
British Columbia, Canada
lorna@digitalstories.ca

Abstract

Fukushima Audio Census (2017) is an interactive
artwork designed for the CHI 2017 art program. Live
audio is transmitted from strategically placed
microphones in the exclusion zone of a contaminated
forest located 10 kilometers from the Daiichi Nuclear
Power Plant in Japan. The artwork invites conference
attendees to listen to forest sounds, retrieve past
recordings, and talk with experts in the field of
ecological neutrality. It thus creates a community
among listeners at the conference, researchers, and
creatures within the exclusion zone.

Author Keywords

Interactive art; sustainability; ecological neutrality.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g.,
HCI): Miscellaneous.

Introduction

The artwork is based on *Live Sound from Fukushima*
(2016), a project produced by researchers Dr. Hiroki
Kobayashi and Hiromi Kudo at the Center for Spatial
Information Science (CSIS) at The University of Tokyo,
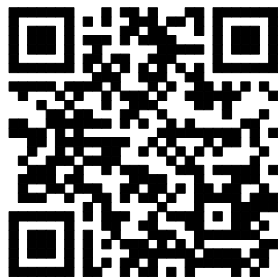Chiba, Japan.

Figure 1: Access the Fukushima Audio Census artwork at radioactivelivesoundscape.net

This project is part of a larger collaboration with scientists to collect, share, and analyze the sound-scape data from over 500 locations in the exclusion. The artwork will allow conference attendees to experience the soundscape through a mobile application, thus virtually situating them in relation to the "non-site" of the Fukushima exclusion zone. They hear sounds of creatures that otherwise remain off-limits to the ears of the public.

The evoked sense of community acts as a counteragent to strategies of disavowal, commonly befalling the collective consciousness after experiences of disaster and shock. Social media integration facilitates a dialogue between listeners and experts at CSIS, creating an awareness for continuing animal life within sealed off territories, while at the same time fostering understanding of the intricate ecological issues connected to the Fukushima phenomena.

Live Sound from Fukushima was originally designed to help scientists such as Ishida Ken in placing portable digital recording devices to capture vocalizations of specific animals in the wild [1]. The system is comprised of microphones and transmission stations strategically placed in a contaminated forest within the exclusion zone, located 10 km from the Fukushima Daiichi Nuclear Power Plant (F1NPS).

Figure 2 illustrates the distance between our project site and the power plant in the exclusion zone. Our transmitter station (Figure 3) is located in the Oamaru district. It is a very remote location, rendering traditional modes of continuous long-term investigation extremely difficult. Hence, it constituted an ideal deployment site for the project.

Figure 2. Location of the project site in the exclusion zone (37° 28' 04.3" N, 140° 55' 27.5" E), which is 10 km from Fukushima Daiichi Nuclear Power Plant

Figure 3. The microphone and transmitter station is located in the Oamaru district, near Namie town, GPS coordinates are (37° 28' 04.3" N, 140° 55' 27.5" E).

The artwork is comprised of two separate subsystems: The Field Encoding System, used to digitize live sounds from within the forests, and the Streaming/Archiving System to conduct live sound delivery via the Internet and to archive sound data in the form of archived files. Technical architecture and operational implications of the system have been discussed previously in [2] [3].

The Field Encoding System (Figure 4) is comprised of an audio block and a transmission block. The microphones are individually connected to the amplifier of the audio block. Their respective outputs serve as input to the audio encoder converting recorded sounds into MP3, the format used for subsequent digital sound delivery. The Streaming/Archiving System is located in the server room in our laboratory and has a normal bandwidth Internet connection, allowing simultaneous public access to transmissions, shown Figure 4. Two servers are used, one for streaming and the other for archiving.

The processed audio signal is sent from the microphone, encoded into an MP3 live stream in the Field Encoding System, and transferred to the Streaming/Archiving System (Figure 5). Subsequently, the live stream can simultaneously be played on MP3-enabled audio clients worldwide. Construction of Live Sound from Fukushima was completed in March 2016. We obtained permission to release audio through the WEB interface in mid-August 2016. The project team aims to operate the system continuously, 24 hours a day, 365 days a year. We anticipate operating this project until 2030.
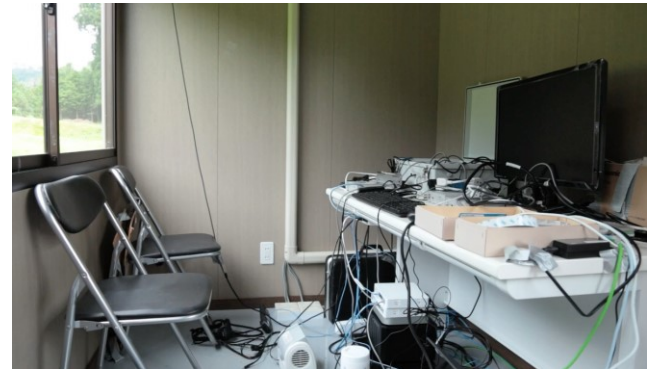

Figure 4. Detail of Field Encoding System: the microphones are individually connected to the amplifier and audio signals are transcoded to MP3. See [2] [3]
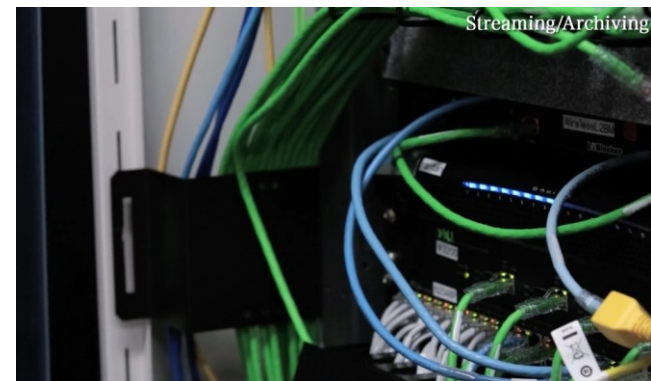

Figure 5. Detail of the *Streaming/Archiving System*. The MP3 live stream is available for playback worldwide.

Art Program Installation

Fukushima Audio Census (2017) is a work specifically designed for the CHI 2017 art program. We have adapted our *Live Sound from Fukushima* project to exhibit our audio census feature for mobile devices.

Dr. Hiroki Kobayashi has been working with ecology scientists to develop a new type of bird census method – *audio census* – one that uses our live stream audio and social media systems (Internet Relay Chat and Twitter) [3]. He learned that when ornithologists based in diverse locations used the *Streaming/Archiving System* to conduct a woodland bird census remotely, more species were identified than during a field-based spot-census (36 identifications vs. 28) [3].

We exhibit this new audio census at CHI 2017 in order to initiate and foster discussions on the practice of designing for ecological neutrality. To this end, the existing platform is combined with developed frameworks for dissemination of social media content and facilitation of public discourse [4]. In the following section, we discuss how visitors will experience the artwork.

Intended Experience

From May 5 to 12, 2017 we will invite CHI 2017 conference attendees to access *Fukushima Audio Census* [4]. From the CHI 2017 art program web page listeners will connect to our *Streaming/Archiving System at* radioactivelivesoundscape.net. As seen in Figure 7, people will be able to launch live audio streams or listen to archived recordings by scrolling through an interactive map of the Oamaru district in Japan.
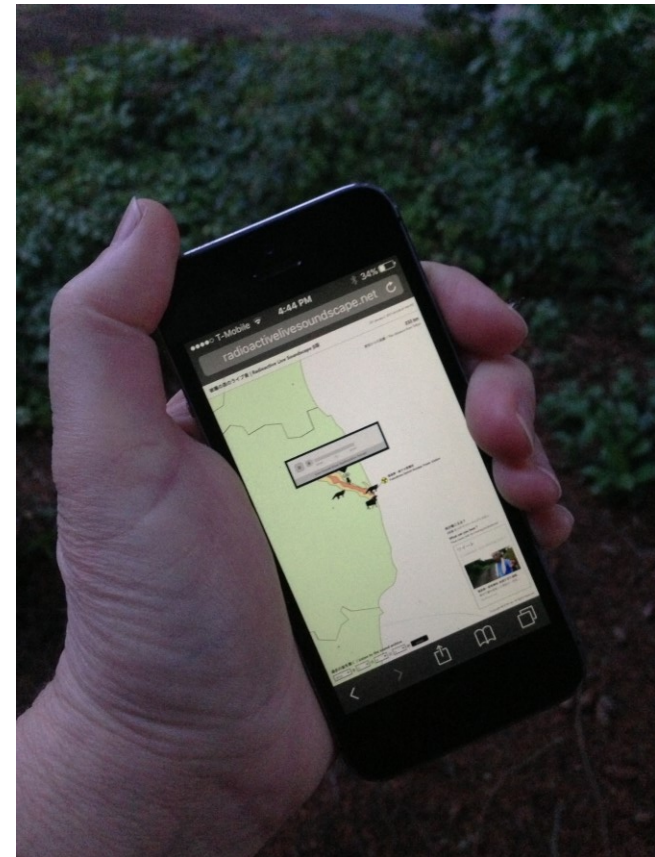

Figure 6. *Fukushima Audio Census* as viewed on mobile phone. The listener has selected the microphone icon and can now listen to live sounds from the Oamaru district transmitter station inside the exclusion zone.

何が聴こえる？
#被爆 をつけてツイートしてください
What can you hear？
Pleae tweet with the hashtag #cyberforest

ツイート

kaoru saito
@kaorusaito

お早うございます！　今朝の大槌湾、
月明かりと灯台の灯・・ひょうたん島
ライブモニタリング
bit.ly/1U5xniD　#otohama #cyberforest
#ohayo

Figure 9. Screenshot of *Fukushima Audio Census* Twitter posts from experts. English translation "Good morning! Otaru Bay this morning, the moonlight and the lighthouse light…Hyoutanjima live monitoring."

On the map, microphone icons clearly mark where each transmitter station is located. People using this interface will be able to launch the live sound stream by tapping on the screen. Other details concerning the area in question will be communicated through various forms of visual communication. In Figure 6, you see cattle and tanukis by a river-like area, illustrating their proximity to the nuclear plant in the exclusion zone. These details refer to the animals and geographic characteristics of the project site. In addition, listeners can select and launch an archived recording from the selected location by entering the desired date and time (Figure 7). For example, if you wanted to listen to the sounds of the last 6.9 magnitude earthquake, you would enter the corresponding date 2016/11/21[1].

Additionally, conference attendees will be able to comment on what they hear via Twitter (Figure 9). Experts working with the University of Tokyo in Japan will respond to and share information with the CHI 2017 attendees. Live audio, as well as archived recordings serve as reference points for discussion and joint experience.

Technical Requirements

Fukushima Audio Census is an interactive artwork designed for the CHI 2017 art program. Our only requirement is the placement of a link from the CHI 2017 art program to our *Streaming/Archiving System*.

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[1] A list of dates of earthquakes is provided by Wikipedia (https://en.wikipedia.org/wiki/List_of_earthquakes _in_Japan).
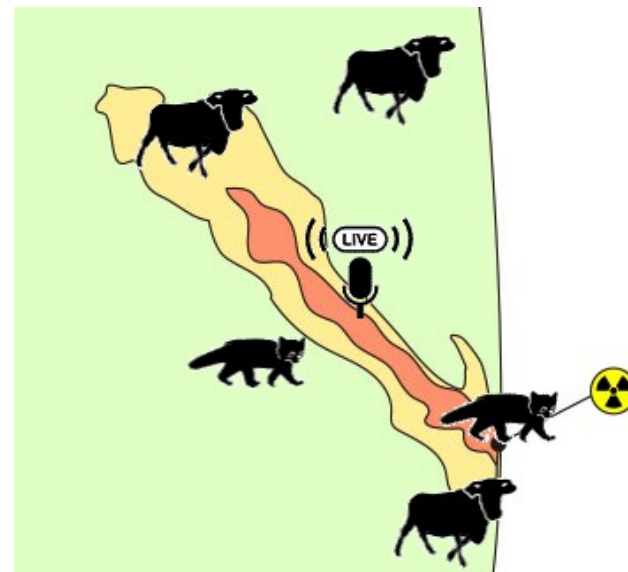
Figure 7. Detail of live microphone, cattle and tanuki icons on the *Fukushima Audio Census* screen. These icons indicate geographic proximity to the nuclear plant around the exclusion zone.

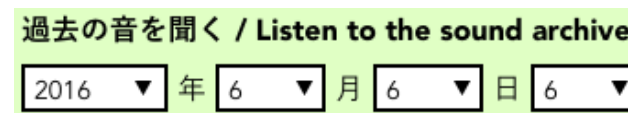過去の音を聞く / Listen to the sound archive
2016 ▼ 年 6 ▼ 月 6 ▼ 日 6 ▼

Figure 8. Detail of archived recording retrieval feature on the *Fukushima Audio Census* screen. By entering a past date, listeners can hear archived sound recordings.

Acknowledgements

Figure 8: Tele Echo Tube, 2010 Watch an interview with Kobayashi (youtube.com/watch?v=KDlQG92_zhQ)on the design of his exhibition at the El Museo Universitario Arte Contemporáneo.

Figure 5. Talking Poles Project, 2011. Public art commission with Vicki Moulder, Lorna Boschman and Cease Wyss and collaborators for the City of Surrey, Canada. Watch an interview with the Sandra Dent as she tests the function of the talking poles on post construction (https://vimeo.com/14702004).

(HCBI) that aims to extend the subject of human computer interaction to non-human actors.

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Artists Biographies

Hiroki Kobayashi is an Artist, Assistant Professor and Director of the Kobayashi Lab (http://kobayashi-lab.com), in Center for Spatial Information Science (CSIS) at The University of Tokyo, Japan. He is also a researcher at Precursory Research for Embryonic Science and Technology (PRESTO), Japan Science and Technology Agency (JST). His work investigates how virtual and ecological systems share similar attributes by design. Kobayashi integrates animal patterns of behavior into the design of wearables and ubiquitous forms of sensing to advance human computer interaction design and ecological neutrality.

Hiromi Kudo is a Researcher at the Japan Society for the Promotion of Science (JSPS) and a visiting researcher at the at the Kobayashi Lab, in Center for Spatial Information Science (CSIS) at The University of Tokyo, Japan. She has developed a conceptual framework for observing the micro to macro interactions of various life forms.

Vicki Moulder (interactionart.org) is an Artist and visiting Researcher at the Kobayashi Lab, in Center for Spatial Information Science (CSIS) at The University of Tokyo, Japan. She holds a PhD (2016) from Simon Fraser University and a BFA from Emily Carr University in visual communications. Molder is a pioneer in the field of social art practice, co-producing artworks with not-for-profit organizations since 1988.

Michael Heidt is a Computer Scientist, Artist and PhD candidate studying at the Chemnitz University of Technology, in Germany. In his most recent media art installation, The Aesthetics of Activism (2016) he explored practices of identity construction with respect to historical narrative and code; and the juxtaposition of digital form and interactional situations.

Lorna Boschman (lornaboschman.com) is an Artist, Researcher and Teacher, holding a PhD (2012) from Simon Fraser University. She studies how community members share health-related knowledge via digital storytelling. Boschman is currently leading Digital Stories.ca, a community-based mobile production studio and learning centre.