Computer Arts Laboratory

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Most of the courses taken by engineers and computer science students emphasize scientific discipline and accumulation of "truth." Computer Arts Lab. activities include such technically objective factors, but also encourage original expression, subjectively motivated by æsthetics rather than "correctness," sometimes "putting the art before the course!" Unlike many other labs' activities that try to converge on a "right answer," artistic disciplines encourage originality, in which the best answer is one that is like no one else's.

The Computer Arts Lab., including through its resident Spatial Media Group,[1] is researching projects including practical and creative applications[2] of virtual reality and mixed (augmented, enhanced, hybrid, mediated) reality and virtuality; panoramic interfaces and spatially-immersive displays (especially stereotelephonics, spatial sound, and stereography); wearable and mobile applications, computing, and interfaces; and networked multimedia, with related interests in CVEs (**c**ollaborative **v**irtual **e**nvironments), groupware and CSCW (**c**omputer-**s**upported **c**ollaborative **w**ork); hypermedia; digital typography and electronic publishing; force-feedback displays; telecommunication semiotics (models of teleconferencing selection functions); information furniture; way-finding and navigation; entertainment computing; ubicomp (ubiquitous computing), calm (ambient), and pervasive technology. We are particularly interested in narrowcasting commands, conference selection functions for adjusting groupware situations in which users have multipresence, virtually existing in more than one space simultaneously. We investigate realtime interactive multimedia interfaces— auditory, visual, haptic, and multimodal:

[1] `http://www.u-aizu.ac.jp/~mcohen/spatial-media/welcome.html`
[2] `https://www.u-aizu.ac.jp/research/researchlist/enlist?searchActivity=5`

Auditory We are exploring interfaces for multichannel sound, including stereo, quadraphonic, and nearphones (mounted on our $\overset{S}{c}ha_{i}r^{e}$ rotary motion platform), as well as speaker array systems in the **U**niversity-**B**usiness **I**nnovation **C**enter 3D Theater.[3] Julián Villegas[4] leads a **S**tudent **C**ooperative **C**lass **P**roject on Pure Data ("Pd"), and also teaches an advanced graduate level course on Music Technology.[5] Lab faculty members Michael Cohen[6] and Julián teach the ITC02: "Intro. to Sound and Audio" graduate school course,[7] featuring extensive experiential learning featuring applications such as Audacity[8] and Pure Data,[9] including tablet-based courseware (an iPad is issued to each student). That course is a prerequisite for "Spatial Hearing and Virtual 3D Sound,"[10] which was started by Prof. Jie Huang in the Human Interface Lab.

We support a Computer Music Studio, featuring keyboard synthesizers and computer music workstations complemented by assorted amplifiers, racks, mixers, and effects processors.

Visual We promote creative applications of scientific visualization, encouraging the use of Mathematica[11] and stereoscopy,[12] including chromastereoscopy[13] (3D images with depth layers cued by color). The annual Chromastereoptic Picture Contest[14] exhibition is mounted[15] in the university library. We enjoy exploiting the unique large-format immersive stereographic display in the UBIC 3D Theater. The "M-Project" student CAD and CG circle[16] is hosted in our lab, under the supervision of Profs. Satoshi Nishimura[17] and Michael

[3] http://www.ubic-u-aizu.jp/shisetsu/kengaku.html
[4] http://www.u-aizu.ac.jp/~julian
[5] http://www.u-aizu.ac.jp/official/curriculum/syllabus/2016_2_E_005.html#ITA01
[6] http://www.u-aizu.ac.jp/~mcohen
[7] http://www.u-aizu.ac.jp/~mcohen/welcome/courses/AizuDai/graduate/Sound+Audio/syllabus.html
[8] http://audacity.sourceforge.net
[9] http://puredata.info
[10] http://onkyo.u-aizu.ac.jp/index.php/classes/3d-sound/
[11] http://www.u-aizu.ac.jp/~mcohen/welcome/courses/AizuDai/Mma.html
[12] http://www.u-aizu.ac.jp/~mcohen/spatial-media/stereograms.html
[13] http://www.chromatek.com
[14] http://web-ext.u-aizu.ac.jp/~mcohen/welcome/courses/AizuDai/undergraduate/HI&VR/ChromadepthPictureContest
[15] http://www.u-aizu.ac.jp/en/intro/facilities/library/library5.html, http://www.u-aizu.ac.jp/intro/facilities/library/library5.html
[16] http://mpro-aizu.blogspot.com
[17] http://www.u-aizu.ac.jp/e-intro/e-faculty/e-undergraduate/e-undergraduate2/

Cohen. Students use various CAD authoring tools— such as 3DStudioMax, Blender, Maya, and Sketch-Up, as well as Illustrator and PhotoShop— to make digital contents such as videos. A photomosaic of our faculty was compiled, both hyperlinked[18] and flickering.[19] We are also exploring creative applications of panoramic imaging and object movies, including a virtual tour of the university[20] and photospheres of the university in Spring[21] and Winter[22].

Haptic We are also exploring the use of haptic interfaces, including force-display joysticks and a rotary motion platform (the "$\overset{\text{S}}{\text{c}}\text{ha}_{\text{i}}\text{r}^{\text{e}}$ [for 'shared chair'] Internet Chair"). We deployed the sudden motion sensor in a laptop for gyroscopic control of avatars in virtual environments.[23] We also convene annual **C**reative **F**actory **S**eminars.[24] Iin conjunction with Prof. Rentaro Yoshioka[25] of the Active Knowledge Engineering Lab., we conduct a workshop on Haptic Modeling and 3D Printing,[26] using force-feedback CAD workstations[27] to make models that are then rapid prototyped (as stereolithograms) with a personal fabricator, closing the "idea (stored in brain neurons) – information (stored as bits) – matter (atoms)" pathway.

Multimodal Using such multimodal interfaces, our students have crafted driving simulators, location-based games featuring the rotary motion platform,[28] and synæsthetic (cross-sensory modality) visual and haptic music players (rendering songs as light shows[29] or dancing chairs[30]). Using visual sensing techniques, narrowcasting postures can be recognized, and used to control

e-nisim.html

[18] http://www.u-aizu.ac.jp/~mcohen/welcome/UoAmosaic/faculty2.html

[19] http://www.u-aizu.ac.jp/~mcohen/welcome/UoAmosaic/faculty.gif

[20] http://www.u-aizu.ac.jp/~mcohen/welcome/courses/AizuDai/undergraduate/HI&VR/VirtualTour/

[21] https://theta360.com/s/gdDcKZaDaa9PKL5F9eeJ4T47A

[22] https://theta360.com/s/3SiAETczscXILlKMb5CldF5RE

[23] http://sonic.u-aizu.ac.jp/spatial-media/mixedreality/Videos/SMS-CVE.m4v

[24] http://web-int.u-aizu.ac.jp/official/faculty/sad/CFSlist.pdfl

[25] http://www.u-aizu.ac.jp/~rentaro

[26] http://www.u-aizu.ac.jp/official/curriculum/syllabus/2_E_000.html

[27] http://geomagic.com/en/products-landing-pages/sensable

[28] http://sonic.u-aizu.ac.jp/spatial-media/mixedreality/Videos/KuruKuru-pitcher-long.mov

[29] http://sonic.u-aizu.ac.jp/spatial-media/mixedreality/Videos/CITMixedReality_Demo.wmv

[30] http://sonic.u-aizu.ac.jp/spatial-media/mixedreality/Videos/keitai+Schaire2.mov

distributed chatspaces or virtual concerts. We are interested in exploring using figurative interfaces to express emotion and to control narrowcasting privacy using a media mixing system for advanced conferencing features. We are also exploring extensions of Open Wonderland,[31] an open-source framework for developing virtual reality environments. Group members developed windshield wipers that dance, featuring beat detection, a digital phase-locked loop, and articulated wiper gestures.[32] Lately we have been playing with the Unity[33] IDE, including deployment in HMDs, such as the HTC Vive.[34]

We are also exploring mobile (nomadic, portable) computing, working in conjunction with university spin-offs Aizu Lab,[35] The Designium,[36] Eyes, JAPAN,[37] and GClue.[38] We have developed and published the "Twhirleds" app[39] on Google Play for Android[40] and Apple iTunes App Store for iOS.[41] Such *keitai*-based interfaces can be used to control internet appliances, panoramic imaging, spatial sound, or motion platforms.

A advanced undergraduate course on "Human Interface and Virtual Reality"[42] and a parallel graduate course "Multimedia Machinima"[43] surveys many of these topics, contextualized by "machinima" (machine cinema) using "Alice,"[44] featuring student-designed and -programmed, computer-generated interactive stories with 3D animation— including texture maps, photographic compositing, audio effects, speech synthesis, background music— and segments on panoramic and turnoramic imagery, stereopsis, and groupware.

Other activities:

We host an annual symposium, the Int. Symposium on Spatial Media,[45] invit-

[31] http://openwonderland.org
[32] http://www.u-aizu.ac.jp/~mcohen/spatial-media/VMPMyRide
[33] https://unity3d.com/
[34] https://www.vive.com/
[35] http://www.aizulab.com
[36] http://www.thedesignium.com
[37] http://www.aizu.com
[38] http://www.gclue.com
[39] http://www.u-aizu.ac.jp/~mcohen/spatial-media/Twhirleds/
[40] https://play.google.com/store/apps/details?id=jp.ac.u_aizu.Twhirleds
[41] https://itunes.apple.com/us/app/twhirleds/id962674836
[42] http://web-int.u-aizu.ac.jp/~mcohen/welcome/courses/AizuDai/undergraduate/HI&VR/
[43] http://web-int.u-aizu.ac.jp/~mcohen/welcome/courses/AizuDai/graduate/Multimedia_Machinima/
[44] http://www.alice.org
[45] http://www.u-aizu.ac.jp/~mcohen/welcome/ISSM/14-15/

ing experts to share their knowledge and passion regarding such themes as "Spatial Sound and Spatial Telepresence" ('00–'01), "Magic in Math and Music" ('01–'02), "Advanced Multimedia and Virtual Reality" ('02–'03), "Spatial Sound" ('03–'04), "Hearing and Sound Installations" ('04–'05), "Sound, Audio, and Music" ('05–'06), "Interactive Media, Security, and Stereography" ('06–'07), "Internet Media" ('07–'08), "Computation and Music" ('08–'09), "Systems and Applications" ('09–'10) "Distributed, Mobile, and Ubiquitous Multimodal Interfaces" ('10–'11), "Social Multimedia" ('11–'12), "Visual Interfaces for Multimedia Systems" ('12–'13), "Multimodal Signs: Computer Enhancement of User Experience" ('13–'14), and "Audio and Music" ('14–'15), "Cybersound" ('15–'16). This past year our meeting was held partly in conjunction with the Autumn Meeting of the Acoustical Society of Japan. Our meeting this year will be held in conjunction with the Health 2.0 Fukushima Chapter/Medical × Security Hackathon 2017[46] at Alts Hoshino Bandai Ski Resort.[47]

Our lab sponsors several student performance circles, including the Yasakoi Dance Circle,[48] and DMC, the **D**isco **M**ix **C**lub.We also sponsor the Dual Boot (Ultimate Frisbee) Flying Disc Club.[49]

Through the research & development, the deployment & integration of stereographic, spatial sound, haptic, and mobile applications, including virtual and mixed reality, we nurture scientific and artistic interest in advanced computer–human and human–human communication. Our ultimate domain is the exploration of interfaces and artifacts that are literally sensational.

Some relevant links:

Spatial Media `http://sonic.u-aizu.ac.jp/spatial-media/Videos/cohea.html`

English `http://sonic.u-aizu.ac.jp/spatial-media/Videos/coheen.mpg`

Japanese `http://sonic.u-aizu.ac.jp/spatial-media/Videos/cohejp.mpg`

Multimedia and Virtual Reality Videos: `http://sonic.u-aizu.ac.jp/spatial-media/Videos/`

Mobile control of rotary motion platform `http://sonic.u-aizu.ac.jp/spatial-media/Videos/keitai+Schaire2.mov`

[46] `https://health2con.jp/archives/2141/`
[47] `http://www.alts.co.jp`
[48] `http://www.u-aizu.ac.jp/circles/yosakoi`
[49] `http://www.u-aizu.ac.jp/circles/dualboot`

Dual Driving Simulator http://sonic.u-aizu.ac.jp/spatial-media/Videos/DualDrivingSimulator.mov

"VMP My Ride" http://sonic.u-aizu.ac.jp/spatial-media/Videos/VMPMyRide.mp4

Mixed Reality Videos http://sonic.u-aizu.ac.jp/spatial-media/mixedreality/Videos/

Cluspi Control of Rotary Motion Platform http://sonic.u-aizu.ac.jp/spatial-media/Videos/CLUSPI_demo-QT.mov

Audio Narrowcasting for Multipresent Avatars on Workstations and Mobile Phones http://sonic.u-aizu.ac.jp/spatial-media/mixedreality/Videos/00612_00000.mpg

Sudden Motion Sensor Control of Collaborative Virtual Environment http://sonic.u-aizu.ac.jp/spatial-media/Videos/SMS-CVE.m4v

"Twin Spin" iOS and Android CVE Interface http://sonic.u-aizu.ac.jp/spatial-media/Videos/TwinSpin.m4v

"Whirled Worlds" iOS and Android CVE Interface http://sonic.u-aizu.ac.jp/spatial-media/mixedreality/Videos/Tworlds2.mp4

"Whirled Worlds": Pointing and Spinning Smartphones and Tablets to Control Multimodal Augmented Reality Displays http://sonic.u-aizu.ac.jp/spatial-media/mixedreality/Videos/Whirled_Worlds.mov

Spatial Media Group YouTube Channel https://www.youtube.com/channel/UCJrpDTHGCuNvdW_vdDkFB6g

"Twhirleds" for iOS and Android https://www.youtube.com/watch?v=XF2pGPDrr7s

"CVE": Collaborative Virtual Environment https://www.youtube.com/watch?v=4jauDFbTxgg

Padiddle and Poi rigs: spinning and whirling control of photospherical browsing https://www.youtube.com/watch?v=Fpgj6nNb6ns

Motorized turn-table for automatic panning capture https://www.youtube.com/watch?v=XvMFTTOM9_U

"Schaire" Rotary Motion Platform https://www.youtube.com/watch?v=ttK4yGpBkw0

"Lights, Camera, Action!": Ambient lighting extending photospherical display https://www.youtube.com/watch?v=Y7uIvOCgxpE

"Exocentric Rendering of 'Reality Distortion' User Interface Illustrating Egocentric Reprojection" https://www.youtube.com/watch?v=lC7cNSB1ZWE

Panoramic and Photospherical Imagery U. of Aizu Panorama http://sonic.u-aizu.ac.jp/spatial-media/QTVR/Aizu_Daigaku.mov

Object Movie http://sonic.u-aizu.ac.jp/spatial-media/QTVR/shoe.mov

Hideo Noguchi + Akabeko http://sonic.u-aizu.ac.jp/spatial-media/QTVR/Noguchi+Akabeko.mov

Rotational Degrees of Freedom http://sonic.u-aizu.ac.jp/spatial-media/QTVR/Rotational-DsoF.mov

Spring https://theta360.com/s/gdDcKZaDaa9PKL5F9eeJ4T47A

Winter https://theta360.com/s/3SiAETczscXILlKMb5CldF5RE

Virtual tour of the U. of Aizu http://www.u-aizu.ac.jp/~mcohen/welcome/courses/AizuDai/undergraduate/HI&VR/VirtualTour/

Press and Mass Media Coverage Nikkei BP Mook, 2008–9 http://ec.nikkeibp.co.jp/item/books/K00710.html

Fukushima Minpo", June 14, 2009: "I Do Love Aizu" http://www.u-aizu.ac.jp/~mcohen/welcome/Aizu/IDoLoveAizu.html, http://www.u-aizu.ac.jp/~mcohen/welcome/Aizu/IDoLoveAizu-J.html

Fukushima Minpo, June 10, 2010 http://www.u-aizu.ac.jp/~mcohen/scrapbook/FukushimaMinpo-10.6.10.jpg

"Nikkei": Nihon Keizai Shimbun, Nov. 5, 2010 (p. 35) http://www.u-aizu.ac.jp/~mcohen/scrapbook/NihonKeizaiShimbun-2010-11-5-p.35.png

Teleview Fukushima, Jan. 4, 2011 http://www.u-aizu.ac.jp/~mcohen/scrapbook/MAH04434-edited.mov

Fukushima Minpo, February 18, 2011 (p. 9) http://www.u-aizu.ac.jp/~mcohen/scrapbook/Fukushima_Minpo_18.2.2011.tiff

University Newspaper, Apr. 8, 2011 http://www.u-aizu.ac.jp/~mcohen/scrapbook/UniversityNewspaper-8.4.11.pdf

FutureGov Asia Pacific, 20 May 2011 http://www.futuregov.asia/articles/2011/may/20/japan-university-helps-special-education-school-ic/

Japan Woche: Interviews mit Michael Cohen und Jun Yamadera, May 25, 2011 https://www.youtube.com/watch?v=ZziK_nueBpI

AERA English, October 2011 http://www.u-aizu.ac.jp/~mcohen/scrapbook/AERAEnglish004.pdf

Twirling interface developed for mobile ambient communication, Jan. 25, 2013 http://www.diginfo.tv/v/12-0195-d-en.php

Bektur Ryskeldiev, Julián Villegas, and Michael Cohen: Exploring virtual sound environments with mobile devices. In TSJC: Tohoku Section Joint Conv. Record of Institutes of Electrical and Information Engineers, Japan, p. 18, Aizu-Wakamatsu, Aug. 2013, Best Paper Prize, Student Section.

Sanuki Wataru. "Machi-Beacon". "Aizu Industry IT Technology" contest, Jan. 2014. Aizu IT Forum Encouragement Prize. Supervised by Julián Villegas and Michael Cohen. http://www.city.aizuwakamatsu.fukushima.jp/docs/2014010600066/

"Universities challenge to globalization" http://www.u-aizu.ac.jp/~mcohen/scrapbook/p11_kiji2_131014.pdf

Best Paper Award, Information Visualization track and overall, VSMM http://www.vsmm2014.org/awards?_escaped_fragment_=awards/c1x35#!awards/c1x35

Michael Cohen, Rob Oudendijk, and Yuka Hayashi: Dancing Wipers.[50] In Maker Faire, Tokyo, August 2015.[51]

AIZU×DEAIs 2015 Edition (university promotional video) https://www.youtube.com/watch?v=iy6NGm9awEw

"Lights, Camera, Action!": ambient lighting extending photospherical display. 3rd Prize, Posters & Demonstrations, VRCAI http://www.u-aizu.ac.jp/en/information/VRCAI2015.html

Gokujo-no-Aizu Project Council https://www.facebook.com/gokujounoaizu.iti

UoA Student Teams Win Grand Prize and Other Awards at SPAJAM 2016 Sendai Qualifier; http://www.u-aizu.ac.jp/en/information/spajam-sendai2016.html

Team with UoA Student Win Awards at the Tokyo Round of Japan VR Hackathon 2016; Japan VR Hackathon 2016 http://www.u-aizu.ac.jp/en/information/vr-hack2016.html

"Best Paper Award," Electromagnetics and Control Systems Track, at IEEE IEMCON 2016 http://www.u-aizu.ac.jp/en/information/ieee-iemcon-2016.html

[50] http://makezine.jp/event/makers2015/yr-design/

[51] http://makezine.jp/event/mft2015/en/

Refereed academic journal

[julian-302-016-01:2015] Julián Villegas. Locating virtual sound sources at arbitrary distances in real-time binaural reproduction. *Virtual Reality*, 19(3):201–212, 2015.

> A real-time system for sound spatialization via headphones is presented. Conventional headphone spatialization techniques effectively place sources on the surface of a virtual sphere around the listener. In the new system, sources can be spatialized at different distances from a listener by interpolating Head-Related Impulse Responses (HRIRs) measured between 20 and 160cm. These HRIRs are stored in different databases depending on the audio sampling rate. To ease the realtime constraints, users can choose the number of hrir taps used in the convolution, and an alternative interpolation technique (simplex interpolation) was implemented instead of trilinear interpolation. Subjective tests showed that such simplifications yield satisfactory spatialization for some angles and distances.

[mcohen-302-016-01:2015] Rasika Ranaweera, Michael Cohen, and Michael Frishkopf. Narrowcasting and Multipresence for Music Auditioning and Conferencing in Social Cyberworlds. *Presence: Teleoperators and Virtual Environments*, 24(3):220–242, Summer 2015.

> We describe a musical cyberworld, "Folkways in Wonderland," in which avatar-represented users can find and listen to selections from the Smithsonian Folkways world music collection. When audition is disturbed by cacophony of nearby tracks or avatar conversations, one's soundscape can be refined since the system supports narrowcasting, a technique which allows information streams to be filtered. An active listener can fork self-identified avatars using a novel multipresence technique, locating representatives at locations of interest, each clone capturing respective soundscapes, controlled using narrowcasting functions. Likewise one can participate in a conference and at the same time join a global tour of music. Our music browser is architected to use IEEE 1599, a comprehensive, multilayered music description standard. Using our cyberworld as a virtual laboratory, we evaluated our system and the effectiveness of narrowcasting when auditioning music and conferencing. Keywords: collaborative virtual environment (cve), collaborative information seeking, computer-supported cooperative work (cscw), world music, ethnomusicology, groupware, narrowcasting, multipresence, virtual conferencing

[mcohen-302-016-02:2015] Boris Veytsman and Michael Cohen. New multibibli-

ography package nmbib. *TUGboat: Communications of the TeX Users Group*, 36(2):133–135, 2015.

http://ftp.jaist.ac.jp/pub/CTAN/macros/latex/contrib/nmbib/

Unrefereed academic journal

[julian-302-016-02:2015] Michael Cohen, Julián Villegas, and Woodrow Barfield. Special issue on spatial sound in virtual, augmented, and mixed-reality environments. *Virtual Reality*, 19(3):147–148, 2015.

Refereed proceedings of an academic conference

[julian-302-016-03:2015] Taku Nagasaka, Shunsuke Nogami, Julián Villegas, and Jie Huang. Influence of spectral energy distribution on elevation judgments. In *Proc. 139 Audio Eng. Soc. Int. Conv.*, New York, Oct. 2015.

The relative influence of spectral cues on elevation localization was investigated by comparing judgements of loudspeaker reproduced stimuli spatialized with three methods: 3D vector-based amplitude panning (3D- vbap), 2D-vbap in conjunction with hrir convolution, and equalizing the stimuli to simulate spectral peaks and notches naturally occurring at different angles (equalizing filters). For the last two methods a single horizontal loudspeaker array was used. As expected, smallest absolute errors were observed in the vbap judgements regardless of presentation azimuth; no significant difference in the mean absolute error was found between the other two methods. But, for most presentation azimuths, the method based on equalizing filters yielded less dispersed results. These results could be used for improving elevation localization in two-dimensional vbap reproduction systems.

[julian-302-016-04:2015] Shunsuke Nogami, Taku Nagasaka, Julián Villegas, and Jie Huang. Influence of spectral energy distribution on subjective azimuth judgements. In *Proc. 139 Audio Eng. Soc. Int. Conv.*, New York, Oct. 2015.

In this research, we compare subjective judgements of azimuth obtained by three methods: Vector-Based Amplitude Panning (vbap), vbap mixed with binaural rendition over loudspeakers (vbap+hrtf), and a newly proposed method based on equalizing spectral energy. In our results, significantly

smaller errors were found for the stimuli treated with vbap and hrtfs; differences between the other two treatments were not significant. Regarding spherical dispersion of the judgements, vbap results have the greatest dispersion, whereas the dispersion on the results of the other two methods were significantly smaller, however similar between them. These results suggest that horizontal localization using vbap methods can be improved by applying a frequency dependent panning factor a opposed to a constant scalar as commonly used.

[julian-302-016-05:2015] Bektur Ryskeldiev, Michael Cohen, and Julián Villegas. Rendering spatial audio through dynamically reconfigurable smartphone loudspeaker arrays. In *Proc. Int. Conf. on Virtual Reality Continuum and Its Applications in Industry*, Kobe, Oct. 2015.

Spatial audio for multiple listeners can be rendered through an array of loudspeakers. However, changing loudspeaker locations during a listening session is cumbersome, since circumstances depend on various physical conditions, such as the size of a listening room, number of participants, or locations of power sources. This study investigates alternatives for reconfigurable scenarios through wireless audio streaming via smartphones, as well as indoor positioning techniques for creation of robust auditory imagery.

[mcohen-302-016-03:2015] Zhi-Yong Qiu, Qiangfu Zhao, and Michael Cohen. Restoration and Enhancement of Panoramic Imagery Based on Image Subjects Captured at Different Focal Distances. In *Proc. IEEE iCAST: Int. Conf. on Awareness Science and Technology*, pages 184–189, Qinhuangdao, China, September 2015.

It is known that images as seen by human vision and as captured by camera lens are evidently different. In general, a human eye can see the majority of the view field. However, a lens has limited visual range due to various specifications and uses. We can obtain a panoramic image that has a wider view field using stitching techniques from input images captured by putting the lens in different view angles. However, the panorama image may not be clear enough due to various reasons. In this study, we address a challenging problem where each input image is focused to a certain view point with a different distance. Since the lens has a finite depth-of-field, part of the image must contain some out-of-focus blur. To synthesize a clear panorama image from such kind of blurred input images, it is necessary to de-blur the input images first. In this paper, we assume that spatially variant out-of-focus blur in an input image can be locally approximated by a uniform blur, and study

a matting-based method for restoring the image via de-convolving the input image.

[mcohen-302-016-04:2015] Naoki Tsukida, Bektur Ryskeldiev, and Michael Cohen. "Lights, Camera, Action!": ambient lighting extending photospherical display. In *Proc. VRCAI: Int. Conf. on Virtual Reality Continuum and Its Applications in Industry*, Kobe, October 2015.

Panoramic and photospherical browsing can be literally illuminated by ambient lighting. We are building systems that use multimodal ubicomp-style interfaces to augment viewing of panoramic imagery. Networked lighting, built using Philips Hue Wi-Fi networked bulbs, can be used to complement photospherical browsing by extending display beyond the edges of a screen.

[mcohen-302-016-05:2015] Bektur Ryskeldiev, Michael Cohen, and Julian Villegas. Rendering spatial audio through dynamically reconfigurable smartphone loudspeaker arrays. In *Proc. VRCAI: Int. Conf. on Virtual Reality Continuum and Its Applications in Industry*, Kobe, October 2015.

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[mcohen-302-016-06:2015] Michael Cohen, Tomohiro Oyama, and Naoki Tsukida. Exocentric Visualization of "Reality Distortion" Interface to Interpret Egocentric Reprojection Perspective. In M. Imura, P. Figuroa, and B. Mohler, editors, *Proc. ICAT-EGVE: Int. Conf. on Artificial Reality and Telexistence and the Eurographics Symp. on Virtual Environments*, Kyoto, October 2015.

Twirling interfaces crafted out of mobile devices (such as smartphones) embedded into twirlable toys can be spun in playful styles. The affordances sense their orientation and allow "mobile-ambient" individual control of public display, such as a large format screen. Typically one or two users will face such graphical display and twirl the manipulables, whilst a representation of them and their toys are projected into fantasy scenes via mixed virtuality rigging of affordance positions. The fantasy scenes are rendered

egocentrically by framing projection of the avatars as a virtual camera orbits around in an arcing, spin-around "inspection gesture." Besides dorsal viewing perspectives, the projection is intended for frontal perspectives as well and also intermediate camera angles. The fantasy scenes are not faithful mappings of the real-life "meatspace" scene, since both avatar handedness and affordance phase are adjusted to flatter frontal views and other camera angles. Environmental lighting is deployed in the user space as a token indicating the position of the virtual camera in the fantasy scene relative to the self-identified avatars. To clarify the "reality distortion," a logically interpolating display of the pre-adjusted scene is hereby introduced, featuring an exocentric perspective with basically fixed camera position. This scene is more like a direct rendering of the user space, stripped of fantasy scene elements, but highlighting the virtual-camera-driven ambidexterity and affordance phase modulation with "ghost" appendages. It features simulation of the orbiting virtual camera as well as the environmental lighting, showing the quadrant-wise determination of the ambient light as the virtual camera sweeps around. It also displays the accumulated phase of the orbiting camera, represented as a coil, making explicit the unresolved tension introduced by the orbit and manifesting as consequent phase perturbation of the projected affordance.

[mcohen-302-016-07:2015] Michael Cohen and Tomohiro Oyama. Exocentric Rendering of "Reality Distortion" User Interface to Illustrate Egocentric Reprojection. In *Proc. SUI: ACM Symp. on Spatial User Interaction*, page 130, Los Angeles, August 2015.

We have been working on "twirling" interfaces, featuring affordances spun in "padiddle" or "poi" style. The affordances, crafted out of mobile devices (such as smartphones) embedded into twirlable toys, sense their orientation and allow "mobile-ambient" individual control of public display, such as a large format screen. Typically users will face such graphical display and twirl the manipulables, whilst a representation of up to two users and their toys are projected into a fantasy scene via mixed virtuality rigging of the affordance position. The fantasy scene is rendered egocentrically by centering the projection on the avatar as a virtual camera orbits around in an arcing, spin-around "inspection gesture." Besides dorsal, "tethered" viewing perspectives, the projection is intended for frontal, "mirror" perspectives as well and also intermediate camera angles. The projection is not a totally faithful mapping of the meatspace scene, since both avatar hand-

edness and affordance phase are adjusted to flatter frontal views and other camera angles. Environmental lighting is deployed in the user space to indicate the position of the virtual camera in the fantasy scene relative to the self-identified avatar. To clarify the "reality distortion," a logically interpolating display of the pre-adjusted scene is hereby introduced, featuring an exocentric perspective with basically fixed camera position. This scene is more like a direct rendering of the user space, stripped of the fantasy scene elements (setting, costume, props, etc.), but highlighting the virtual-camera-driven ambidexterity and affordance phase modulation with "ghost" appendages. It features simulation of the orbiting virtual camera as well as the environmental lighting, showing the quadrant-wise determination of the demultiplexed light as the virtual camera sweeps around. It also displays the accumulated phase of the orbiting camera, represented as a coil, making explicit the unresolved tension, "borrowed" but "unreturned," introduced by the orbit and manifesting as consequent phase perturbation of the projected affordance.

[mcohen-302-016-08:2015] Michael Cohen. Hierarchical Narrowcasting. In *Proc. HCII: Int. Conf. on Human-Computer Interaction– DAPI: Int. Conf. on Distributed, Ambient and Pervasive Interactions*, pages 274–286, Los Angeles, August 2015.

Narrowcasting, in analogy to uni-, broad-, and multicasting, is a formalization of media control functions that can be used to adjust exposure and receptiveness. Its idioms have been deployed in spatial sound diffusion interfaces, internet telephony, immersive chatspaces, and collaborative music audition systems. Here, we consider its application to desk-top music composition systems, using Pure Data ("Pd"), a dataflow language for audio and multimedia, to develop a proof-of-concept. A hierarchical model of a drum kit is deployed, applying narrowcasting at various levels of aggregation to drum machine sequences. These ideas can also be extended to audio augmented reality situations.

[mcohen-302-016-09:2015] Boris Veytsman and Michael Cohen. New Multibibliography Package. In *TUG: The 36th Annual Meeting of the TeX Users Group*, pages 133–135, Darmstadt, July 2015.

`http://tug.org/tug2015/`, `http://www.ctan.org/pkg/nmbib`, `http://ftp.jaist.ac.jp/pub/CTAN/macros/latex/contrib/nmbib/`

[mcohen-302-016-10:2015] Michael Frishkopf, Rasika Ranaweera, and Michael Co-

hen. Folkways in Wonderland: a cyberworld for ethnomusicological exhibition and research. In Chris McDonald and Marcia Ostashewski, editors, *Proc. CSTM: Canadian Society for Traditional Music: Exhibiting Music*, Sydney, Nova Scotia, June 2015.

`http://cstm2015.ca`

[mcohen-302-016-11:2015] Rasika Ranaweera, Michael Frishkopf, and Michael Cohen. Curating Ethnomusicology in Cyberworlds: "World Music in Wonderland". In Chris McDonald and Marcia Ostashewski, editors, *Proc. CSTM Pre-Conference Workshop: Canadian Society for Traditional Music: Curating Ethnomusicology*, Sydney, Nova Scotia, June 2015.

In this workshop we outline and demonstrate a general-purpose cyberworld system, "World Music in Wonderland." This extensible system (built using the Open Wonderland Java-based open source toolkit for creating collaborative 3D virtual worlds) enables configuration of a virtual audio-visual space comprising a series of maps and a built environment (streets, buildings, rooms), and populated by arbitrary collections of sonic tracks (speech, music, sound), together with metadata. Each track, positioned by a visual marker, broadcasts looped sonic content within an audio sphere (its "nimbus"). Within this virtual space, each real-world user appears as (one or more) avatars. As in the familiar video game paradigm, avatars are capable of moving (walking, flying, or teleporting), communicating (via speech or text) with other users, listening to spatialized audio, and browsing metadata; real-world users receive sensory inputs corresponding to the immersive binaural experience of its corresponding avatar(s). We have thus far instantiated this system in two forms, one to display a curated set of Smithsonian Folkways tracks, and the other in support of an SSHRC-funded project "Mnohai'ia lita! Celebrating Eastern European communities and cultures in Cape Breton, Nova Scotia." In the workshop, we outline system design and functionality, suggest possible applications, provide a brief demonstration of system capabilities, and (time permitting) offer the opportunity for workshop participants to embark on short cyberjourneys of their own.

[mcohen-302-016-12:2015] Michael Cohen, Rob Oudendijk, and Yuka Hayashi. Dancing Wipers. In *Maker Faire Tokyo*, August 2015.

http://makezine.jp/event/mft2015/en/, http://makezine.jp/event/makers2015/yr-design/

Unrefeered proceedings of an academic conference

[julian-302-016-06:2015] Ian Wilson, Yuki Iguro, and Julián Villegas. Smoothing-spline ANOVA comparison of Japanese and English tongue rest positions of bilinguals. In *Proc. 1 Int. Symp. on Applied Phonetics*, Mar. 2016.

[julian-302-016-07:2015] Ian Wilson, Yuki Iguro, and Julián Villegas. Articulatory settings of Japanese-English bilinguals. In *Proc. Ultrafest VII*, Dec 2015.

[julian-302-016-08:2015] Julián Villegas, Ian Wilson, Yuki Iguro, and Donna Erickson. Effect of a fixed ultrasound probe on jaw movement during speech. In *Proc. Ultrafest VII*, Dec 2015.

The use of an ultrasound probe for observing tongue movements potentially modifies speech articulation in comparison with speech uttered without holding the probe under the jaw. To determine the extent of such modification, we analyzed jaw displacements of three Spanish speakers speaking with and without a mid-sagittal ultrasound probe. We found a small and not significant effect of the presence of the probe on jaw displacement. Counterintuitively, when speakers held the probe against their jaw larger displacements were found. This could be explained by a slight overcompensation on their speech production.

[julian-302-016-09:2015] Seunghun J. Lee, Jeremy Perkins, and Julián Villegas. Acoustic correlates of tone in Du'an Zhuang: An interplay between pitch and phonation. In *Proc. Int. Conf. on Phonetics and Phonology*, Tokyo, Sep. 2015.

[julian-302-016-10:2015] Julián Villegas, Ian Wilson, and Jeremy Perkins. Effect of task on the intensity of speech in noisy conditions. In *Proc. Acoust. Soc. Japan, Autumn meeting*, Aizu Wakamatsu, Japan, Sep. 2015.

[julian-302-016-11:2015] Ian Wilson, Jeremy Perkins, Julián Villegas, and Ayaka Orihara. Reaction Time to Unnatural and Natural Japanese Pronunciation by Native and Non-Native Speakers. In *Proc. Acoust. Soc. Japan, Autumn meeting*, Aizu Wakamatsu, Japan, Sep. 2015.

[julian-302-016-12:2015] Donna Erickson, Julián Villegas, Ian Wilson, and Yuki Iguro. Spanish Articulatory Rhythm. In *Proc. Acoust. Soc. Japan, Autumn meeting*, Aizu Wakamatsu, Japan, Sep. 2015.

[julian-302-016-13:2015] Jeremy Perkins, Seunghun J. Lee, and Julián Villegas. OCP Effects in Suffixes with Burmese Creaky Tone. In *Proc. 25 Annual Meeting Southeast Asian Linguistic Soc.*, Chiang Mai, Thailand, May 2015.

[julian-302-016-14:2015] Ryo Igarashi and Julián Villegas. Steganography using audible signals for short distance communication. In *Proc. Acoust. Soc. Japan, Autumn meeting*, Aizu Wakamatsu, Japan, Sep. 2015.

[julian-302-016-15:2015] Yu Ito and Julián Villegas. Bass enhancement by actuator-enabled vest. In *Proc. Acoust. Soc. Japan, Autumn meeting*, Aizu Wakamatsu, Japan, Sep. 2015.

[julian-302-016-16:2015] Tsubasa Takahashi and Julián Villegas. study on bimodal navigation systems. In *Proc. Acoust. Soc. Japan, Autumn meeting*, Aizu Wakamatsu, Japan, Sep. 2015.

[julian-302-016-17:2015] Shunsuke Nogami, Taku Nagasaka, Julián Villegas, and Jie Huang. Improvement of azimuth perception in single-layer speaker array systems. In *Proc. Acoust. Soc. Japan, Autumn meeting*, Aizu Wakamatsu, Japan, Sep. 2015.

[julian-302-016-18:2015] Taku Nagasaka, Julián Villegas, and Jie Huang. Novel GUI system for recording subjective responses in hearing experiment. In *Proc. Acoust. Soc. Japan, Autumn meeting*, Aizu Wakamatsu, Japan, Sep. 2015.

[mcohen-302-016-13:2015] Michael Cohen. Keynote address: Cyberspatial Media: 3D Computer Graphics & Audio. In *AUSTech: AUST Int. Conf. on Technology*, Abuja, Nigeria, October 2015.

http://conference.aust.edu.ng/computer-science-symposium-program/

[mcohen-302-016-14:2015] Michael Cohen. Invited talk: Cyberspatial Media for Managing Attention and Privacy: 3D Computer Graphics & Audio. In Incheon Paik, editor, *WEIE: 2nd Wkshp. on Electronics and Information Engineering*, Aizu-Wakamatsu, May 2015.

`http://ebiz.u-aizu.ac.jp/conference/WEIE2015/`

[mcohen-302-016-15:2015] Masafumi Sato and Michael Cohen. Coordinated Panoramic and Photospherical Browsing. In *Proc. HC 2015: 18th Int.*

Conf. on Human and Computer, Aizu-Wakamatsu and Hamamatsu, Japan and Duesseldorf, Germany, December 2015.

In this research, a "photospherical browser" uses imagery captured by a Ricoh Theta camera and displays them on web browsers by "WebGL." They can be displayed on multiple devices synchronized by "WebSocket" and "CVE (Collaborative Virtual Environment)." In the development, "`three.js`" is used to easily handle WebGL. There are three main achievements for photospherical browser: degrees-of-freedom, new input, and Tiling. There are two newly deployed degrees-of-freedom, roll for non-horizontal camera angles, and synchronized of zooming. For input controls, newly developed functionality allows operations by keyboard. "Tiling" is an important feature of this research. In this function, one can divide a photospherical imagery into parts and display them on multiple devices. They are also synchronized by "CVE." This application is executed on the latest versions of web browsers. "Chrome" is compatible with all of the functions. "Firefox" and "Safari" are also good, but don't have enough functionality to use all features. The results are the addition of more freedom to the operations of the photospherical browser and more ways to use it.

[mcohen-302-016-16:2015] Akane Takeshige and Michael Cohen. Mixed virtuality scene modulated by flying disc. In *Proc. HC 2015:* 18th *Int. Conf. on Human and Computer*, Aizu-Wakamatsu and Hamamatsu, Japan and Dusseldorf, dec 2015.

Virtual reality can entertain people. People can easily understand program contents. Our Spatial Media Group has Collaborative Virtual Environment (CVE). Therefore we are building mixed virtuality scene with Alice. In order to merge reality and virtuality, our research uses mobile device's angle. By embedding smartphone in flying disc, real world play can trigger virtual events.

Writing a part of textbook or technical book

[julian-302-016-19:2015] Michael Cohen and Julián Villegas. *Fundamentals of Wearable Computers and Augmented Reality*, chapter Applications of audio augmented reality. Wearware, everyware, anyware, and awareware, pages 309–329. CRC Press, 2015.

[mcohen-302-016-17:2015] Michael Cohen and Julián Villegas. *Applications of Audio Augmented Reality: Wearware, Everyware, Anyware, & Awareware*, chapter 13, pages 309–330. CRC Press: Lawrence Erlbaum Associates, Mahwah, NJ; USA, second edition, 2016.

The previous chapter outlined the psychoacoustic theory behind cyberspatial sound and the idea of audio augmented reality (AAR), including review of its various form factors. *Whereware* was described as a class of location- and position-aware interfaces, particularly those featuring spatial sound. This chapter considers application domains, interaction styles, and display configurations to realize AAR. Utility, professional, and leisure application areas are surveyed, including multimodal AR interfaces featuring spatial sound. Consideration of (individual) *wearware* and (ubicomp) *everyware* is continued from the previous chapter, in the context of "mobile ambient" transmedial interfaces that integrate personal and public resources. Two more "...ware" terms are introduced: "*Anyware*" refers here to multipresence audio windowing interfaces that use narrowcasting to selectively enable composited sources and soundscape layers, and "*awareware*" automatically adjusts such narrowcasting, maintaining a model of user receptiveness in order to modulate and distribute privacy and attention across overlaid soundscapes.

[mcohen-302-016-18:2015] Michael Cohen, Julian Villegas, and Woodrow Barfield. *Special issue on spatial sound in virtual, augmented, and mixed-reality environments*, volume 19, chapter Editors, pages 147–148. Springer, November 2015.

http://link.springer.com/article/10.1007/s10055-015-0279-z

[mcohen-302-016-19:2015] Michael Cohen. *Dimensions of Spatial Sound and Interface Styles of Audio Augmented Reality: Whereware, Wearware, and Everyware*, chapter 12, pages 277–308. CRC Press: Lawrence Erlbaum Associates, 2016.

Time is the core of mul**time**dia, Modern applications are synchronous: dynamic (interactive), realtime (changes reflected immediately), and on-line (networked). Hypermedia is conceptual dimensionality. An introduction to spatial sound in the context of hypermedia, interactive multimedia, and virtual reality is presented. Review theory and practice of spatial sound for entertainment computing, including psychophysical (psychoacoustic) basis of spatial hearing; outlines the mechanism for creating and displaying spatial sound the hardware and software used to realize such systems and display configurations. Basic

principals of relevant physics and psychophysics are reviewed (ITDs: interaural time differences, IIDs: interaural intensity differences, and frequency-dependent attenuation capturable by transfer functions). Modeling of sources and sinks (listeners) elaborates such models to include such as intensity, radiation, distance attenuation & filtering, and reflections & reverberation. Position can be defined as the combination of location and orientation information. Location-based or location-aware services do not generally require orientation information, but position-based services are explicitly parameterized by angular bearing as well as place. "Whereware" suggests using hyperlocal georeferences to allow applications location-awareness; "whence- and whitherware" suggests the potential of position-awareness to enhance navigation and situation awareness, especially in realtime high-definition communication interfaces, such as spatial sound augmented reality applications. Combining literal direction effects and metaphorical (remapped) distance effects in whence- and whitherware position-aware applications invites over-saturation of interface channels, encouraging interface strategies such as audio windowing, narrowcasting, and multipresence.

Research grants from scientific research funds and public organizations

[julian-302-016-20:2015] Anh T Pham, Cohen Michael, Truong Cong Thang, and Julián Vill egas. Study and development of smart supermarket by using visible light communication (VLC) and smartphone technologies, 2015-2018.

[mcohen-302-016-20:2015] Anh Tuan Pham, Julián Villegas, and Michael Cohen. JSPS Kakenhi "Smart Supermarket", 2015-2017.

Academic society activities

[julian-302-016-21:2015] Julián Villegas, September 2015.

Part Time Students Organizer, ASJ Fall 2015.

Advisor for undergraduate research and graduate research

[julian-302-016-22:2015] Taku Nagasaka. Elevation of sound by spectral energy equalization and delay adjustments using single-layer loudspeaker arrays, University of Aizu, University of Aizu, Mar 2015.

[julian-302-016-23:2015] Shunsuke Nogami. Lateralization of sound by spectral energy equalization and delay adjustments using single-layer loudspeaker arrays, University of Aizu, University of Aizu, Mar 2015.

[julian-302-016-24:2015] Ryo Igarashi. A study of ultrasound encoding and decoding based on steganography, University of Aizu, Mar 2015.

[julian-302-016-25:2015] Yu Ito. Loudness perception with headphone and vibration, University of Aizu, Mar 2015.

[julian-302-016-26:2015] Tsubasa Takahashi. Quantifying the benefits of bimodal navigation systems, University of Aizu, Mar 2015.

[mcohen-302-016-21:2015] Sasaki Taishi (s1200189). Graduation Thesis: "Synchronization of Parallel Stereoscopic Machinima Viewports", University of Aizu, 2015–16.

Thesis Advisor: Michael Cohen

[mcohen-302-016-22:2015] Sato Masafumi (s1200062). Graduation Thesis: "Coordinated Panoramic and Photospherical Browsing", University of Aizu, 2015–16.

Thesis Advisor: Michael Cohen

[mcohen-302-016-23:2015] Takeshige Akane (s1200032). Graduation Thesis: "Mixed Virtuality Scene Modulated by Flying Disc", University of Aizu, 2015–16.

Thesis Advisor: Michael Cohen

[mcohen-302-016-24:2015] Rasika Ranaweera (d8121104). Doctoral Dissertation: "Narrowcasting-Enabled Groupware Music Archive Exploration and Gestural Interfaces for Orchestral Control in Cyberworlds", University of Aizu, 2015–16.

Doctoral Dissertation Referee: Michael Cohen

Others

[mcohen-302-016-25:2015] Michael Cohen. Software Engineering Workshop: "Desktop Virtual Reality", October 2015.

AUST: African University of Science and Technology, Abuja, Nigeria

Contributions related to syllabus preparation

[julian-302-016-27:2015] ITA01-Music Technology: The purpose of this course is to study the fundamentals of audio signal processing and its application to music. Besides reviewing the underlying techniques, this course focuses in practical implementations of sound effects, so the course is intense in hands-on exercises, assignments, and projects mainly based on Matlab/Octave, C/C++, and Pure-data.

Advisor of a student club or circle

[mcohen-302-016-26:2015] Michael Cohen: Advisor, DMC (**D**isco **M**ix **C**lub), `http://dmconline.co.cc`

[mcohen-302-016-27:2015] Michael Cohen: Advisor, Yosakoi Dance Circle, `http://www.u-aizu.ac.jp/circles/yosakoi`

[mcohen-302-016-28:2015] Michael Cohen: Advisor, Dual Boot Flying Disc Club, `http://www.u-aizu.ac.jp/circles/dualboot`

[mcohen-302-016-29:2015] Michael Cohen: Co-Advisor (with Satoshi Nishimura), M-Project, `http://mpro-aizu.blogspot.com`

Contribution related to student management(for example, solution of a student-related problem)

[julian-302-016-28:2015] Served as mentor for a AY2015-2016 class

Contribution related to faculty personnel (outside scouting, etc.)

[mcohen-302-016-30:2015] Chairperson, Information Systems Division Faculty Selection Committee

Contribution related to on-campus/off-campus publicity work

[mcohen-302-016-31:2015] Member, PR/Web-site Working Group

[mcohen-302-016-32:2015] Member, Super Global University (SGU) Group II Committee

Contribution related to educational planning management

[julian-302-016-29:2015] Served as member of the Academic Affairs Committee

[julian-302-016-30:2015] Served as member of the Super Global University Committee

Contribution related to planning administration for research, research conferences, or international research

[mcohen-302-016-33:2015] Organizing Chair, ISSM (Int. Symp. on Spatial Media)

[mcohen-302-016-34:2015] Conference Board Member, HCI-DAPI: 3rd Int. Conf. on Distributed, Ambient and Pervasive Interactions, 17th Int. Conf. on Human-Computer Interaction, `http://2015.hci.international/dapi`

[mcohen-302-016-35:2015] Program Committee, ICAT-EGVE 2015 (25th Int. Conf. on Artificial Reality and Telexistence (ICAT) and the 20th Eurographics Symposium on Virtual Environments (EGVE), `http://www.ic-at.org/2015`

[mcohen-302-016-36:2015] Program Committee, ACM SIGGRAPH VRCAI (14th ACM Int. Conf. on Virtual Reality Continuum and Its Applications in Industry 2015) `http://www.cg.ces.kyutech.ac.jp/conference/vrcai2015`

[mcohen-302-016-37:2015] Program Committee, MELECON 2016 (18th IEEE Mediterranean Electrotechnical Conference), April 2016, `www.melecon2016.org`

[mcohen-302-016-38:2015] Organizing Committee, Fall ASJ (Acoustical Society of Japan) Meeting, 9/15, Aizu-Wakamatsu, `http://www.asj.gr.jp/annualmeeting/asj2015autumnCFP_J.html`

[mcohen-302-016-39:2015] Program Committee, Asiagraph 2016 Int. Conf., `https://sites.google.com/site/asiagraph2016/`

[mcohen-302-016-40:2015] Program Committee, Japan Society of Applied Physics Conf.

Other significant contribution toward university planning, management, or administration

[julian-302-016-31:2015] Served as member of SAISUA: the Support Association for Int. Students of the University of Aizu

[mcohen-302-016-41:2015] Competitive Research Funding Evaluation Committee

[mcohen-302-016-42:2015] Graduate School Curriculum Coordinator, Graduate School Virtual Reality & Human Interface Track

[mcohen-302-016-43:2015] Director, Information Systems Division

Did you participate in students recruitment, support the alumni, and/or contact with student's parent? (Yes or No) If yes, please describe what you did.

[julian-302-016-32:2015] Created one problem of the PC-Koshien 2015 problem set

[julian-302-016-33:2015] Proctor for the General Entrance Examination AY 2016

[julian-302-016-34:2015] CS Field examiner for the Graduate School Entrance Exam AY 2016

Did you participate in Public Lectures, and/or Open Campus? (Yes or No) If yes, please describe what you did.

[julian-302-016-35:2015] Participated in both 2015 Open Campus events

[mcohen-302-016-44:2015] Computer Arts Lab participation in *Open Labo* with lab demonstrations: "Computer Music, Spatial Sound, & Computer Graphics"