RAY LC.

Assistant Professor of Creative Media.
City University of Hong Kong School of Creative Media.
Centre Level 7, 18 Tat Hong Avenue, Kowloon Tong, Hong Kong.

[raylc.org | portfolio]
[recfro.github.io | studio]

EDUCATION.

2017-2020 **Parsons School of Design**.
MFA in Design and Technology [thesis], New York, NY 10011.
School of Art, Media, and Technology, advised by Jess Irish and Sven Travis.

2006-2012 **University of California, Los Angeles**.
PHD in Neuroscience [thesis], Los Angeles, CA 90095.
Department of Neurobiology, advised by Dr. Tom Otis.

2000-2003 **University of California, Berkeley**.
BS in Electrical Engineering and Computer Sciences [thesis], Berkeley, CA 94720.
Departments of EECS and Mathematics, advised by Dr. James Landay.

CURATED EXHIBITIONS.

2022 Whopper @ TalkToMe Festival Ukraine, "games and conflict", exhibition, online.
2022 Drizzle @ University of Graz Wegener Center for Climate Change, exhibition.
2022 Drizzle and Chikyuchi (mobile vers) @ Data Art for Climate Action Gallery, exhibition.

2021 Make4Green @ JCCAC Floating Projects, "participatory sustainability art", exhibition.
2021 Prismatic @ CityU SCM MFA showcase, JCCAC, "on bodily interactions", exhibition.
2021 Insphere @ Sketch 2, Floating Projects Hong Kong, ML drawings, exhibition.
2021 Presentation of Self in Machine Life @ NYSCI @ Brick Theatre @ CityU, performance.
2021 Down to the Holograph @ Ars Electronica Artificial Intentionalities, exhibition, online.
2021 Home Alone @ Ars Electronica .art Concrete House Global Gallery, exhibition.
2021 I'm Always Here @ Osage Gallery Hong Kong, VR and machine learning, exhibition.
2021 I Love You Project @ SDGs X ARTs, Museum of Tokyo University of the Arts, exhibition.
2021 Chikyuchi @ Art Machines 2 Constructing Contexts exhibit, Hong Kong, exhibition.
2021 Mimicry of Hollows @ The 5th Floor Gallery, Tokyo Japan, exhibition.
2021 I Was of Three Minds @ Floating Projects, JCCAC, machine learning art, exhibition.
2021 D-Normal V-Essay @ Floating Projects, choreographing a VR dance, exhibition.

2020 Navigating in Place @ Generative Art Conference, place and grid cells, exhibition.
2020 NeurIPS, "Imitations of Immortality," GPT-2-human poetic variations, exhibition.
2020 Decertainfy @ Burning Man BRCVR and Ars Electronica .art Gallery, film.
2020 Just a Stage @ Elektron Tallinn residency "dis/placed," performance.
2020 Skin of Our Sheath @ New Museum EdgeCut "VR in situ dance," performance.
2020 NYC Short Documentary Film Festival, "Shamima" official selection, film.
2020 Navigating in Place @ Kone Foundation Saari Residency, exhibition, online.

2020 Network Intelligence @ CICA Museum 6th International New Media Art, exhibition.

2019 A Case for Play @ NeON Digital Arts fest, “Empowering Rohingya Refugees”, exhibition.
2019 Technology and Social Good @ Columbia University curator and artist, exhibition.
2019 Expressive Motions @ IEEE ICRA-X Robotic Art, “Secret Lives of Machines”, exhibition.
2019 An Immersive Rohingya Experience @ Ars Electronica Linz, exhibition.
2019 Rohingya Documentaries and VR Experience @ THP ArtLab Lahore, exhibition.
2019 Machine Gaze @ New York Hall of Science, “a curious surveillance camera”, exhibition.
2019 Creative Flow @ DeConstrukt NYC, “generative dance with wearable beats”, exhibition.

2018 Flora @ Java Studios NYC, “evolution of digital TVs in physical interaction”, exhibition.
2018 Artistic Intelligence @ ISCMA Art Machines, “visually speaking sculpture”, exhibition.
2018 G[AR]MENT @ NYC Media Lab, “augmented reality fashion show”, exhibition.
2018 Secret Lives of Machines @ Parsons Major Major, “emotional devices,” exhibition.
2018 Tektiles Resident @ Brooklyn Fashion Design Accelerator, exhibition.
2017 Gesturize @ Loomia Creator Lab, “fashion tech design for embodied action”, exhibition.
2017 Process Space LMCC Governor’s Island, gesture recognition dance improv, exhibition.

2015 3rd Skin @ Tokyo Golden Egg, “fashion tech painting”, performance.
2015 Artificial Gaze @ Tokyo Bunka Gakuen, “computer vision inspired fashion”, exhibition.
2014 ダンス目なし @ 12th 1_Wall Gallery show, “movement with seeing” photos, exhibition.
2014 Kapayaan @ Bohol Center Philippines, “Philippines before Haiyan”, exhibition.
2014 A Fable @ Gallery Hana Shimokitazawa, “machine-made stories”, exhibition.
2013 Implicit Mirror @ BankArt NYK, TPAM Yokohama Japan residency, exhibition.
2013 Species Descent @ Kiyoshi Saito Museum group residency, exhibition.

SELECTED ENGAGEMENTS.

2022 Collaborative Writing for Purposed Design @ Goethe Institute, workshop.
2022 Technology, Identity, and Power @ M+, “on neuro psych art game design”, panel.
2022 ACM IUI Intelligent User Interfaces HAI-GEN workshop on human-AI, workshop, paper.
2022 Game Kitchen @ Goethe Institute @ Current Plans, “Games for Social Good”, talk.

2021 Dance Fusion @ Hong Kong Art Center, Art Factory performance fellow, course.
2021 Climate Fiction for Social Purpose @ ICIDS Interactive Storytelling, workshop.
2021 IASDR Congress of Design Research “Emotional Capacities in Design” panel, chair.
2021 HKUST Computational Media Arts Seminar “HCI in artistic interventions”, talk.
2021 Cranbrook Academy artist’s workshop “Creative explorations in machine learning”, talk.
2021 Tsinghua-Politecnico Milano Future Fashion, “Second Organ” Aria Bao, contest winner.
2021 ACM UIST, “LineUp: Projection-based AR language learning” Hongni Ye, contest winner.
2021 Remote Bodies @ Digitally Engaged Learning DEL conference HKBU AVA, paper.
2021 Posthuman Art @ Ars Electronica Hong Kong Garden, “Mind the Machine”, talk.
2021 ACM IDC Interaction Design and Children, “KOMI: smart toy for feline pets,” talk.
2021 Clothes for Robots @ ACM IEEE HRI Human Robot Interaction, workshop.

2020 ACM FDG, “Echo Hunt: A case study in player interaction in VR vs 2D screen,” demo.
2020 Alien Life @ Angewandte Festival “Uncertainty in quantum and human scale,” talk.
2020 Just a Stage @ Elektron Tallinn mentor “Fruitful Misunderstandings,” talk.
2020 CHI Play, “Effects of NPC player type on moral responses in interrogation.” poster.

2019 NeON Digital Arts Festival REACT, "360 Filmmaking for Empowerment," workshop.
2019 Ars Electronica Future Innovators Summit and Exhibit, "Future Humanity," talk.
2019 Immersive Storytelling of Rohingya Refugee Experience @ THP ArtLab Lahore, talk.
2019 Creative Tech Week Conference NYC, "Secret Lives of Machines," talk.
2019 Critical Creative Practice, CAMD Symposium at Northeastern University Art Media, talk.
2019 International Symposium on Computation Media Art, City Univ of Hong Kong, talk.

2018 VRbal @ Microsoft Imagine Cup finals, "ML-based VR training for speech", talk.
2018 Serendicity @ Verizon AI Design Jam Parsons School of Design, talk.
2016 Falling Walls Tokyo invited by Euraxess Japan, "Extinguishing Fear", talk.
2016 7th International Symposium on Optogenetics, Tokyo Medical Dental University, poster.
2015 45th Society for Neuroscience meeting, Chicago IL, poster.
2015 38th Japan Neuroscience Society annual meeting, Kobe Japan, poster.
2015 Doshisha University Faculty of Medical Sciences, invite Hiroaki Taniguchi, Kyoto, talk.
2014 Juntendo University Medical School M2/M3 series, invite Dr. Junichi Azuma, Tokyo, talk.
2013 RIKEN BSI Annual Retreat, Karuizawa, Japan, poster.
2012 Harvard Genetics Seminar talk and visit, invite Dr. Jesse Gray, Boston, MA, talk.
2012 UCLA Undergraduate Research Fellowship Program colloquium, Los Angeles CA, poster.
2011 2nd Cold Spring Harbor Computational Cognitive Neurobiology, China, workshop.
2011 UCLA Interdepartmental Neuroscience Program retreat, Los Angeles CA, talk.
2011 Gordon Conference on Cerebellum in Health and Disease, New London NH, poster.

2010 Cold Spring Harbor computational neuro summer workshop, Suzhou China, talk.
2010 13th Annual UCLA Science Poster Day, Los Angeles, CA, poster.
2010 7th Forum of European Neuroscience, Amsterdam Netherlands, poster.
2010 7th Okinawa Computational Neuroscience Course, Okinawa Japan, talk.
2010 17th Cognitive Neuroscience meeting, Montreal Canada, article.
2009 RIKEN Brain Science Institute Summer Program, Tokyo Japan, poster.
2009 4th UCLA Dynamics of Neural Microcircuits Symposium, Los Angeles CA, poster.
2008 UCLA Neuroscience Graduate Forum, Los Angeles CA, talk.
2008 12th UCLA Brain Research Institute Neuroscience poster, Los Angeles, CA, poster.
2008 38th Society for Neuroscience meeting, Washington DC, poster.
2008 25th Microelectrode Techniques for Cell Physiology, Plymouth UK, workshop.
2006 Berkeley Scientific "Anticipatory postural adjustment in unloading", Berkeley CA, paper.
2006 Berkeley Scientific "Protein sequence alignment folding simulation", Berkeley CA, paper.
2005 UC Berkeley Psychology undergraduate research fair, Berkeley CA, poster.
2005 Palo Alto Research Center undergraduate colloquium, Palo Alto CA, poster.

REFEREED PUBLICATIONS.

2022 **LC R**, and Monir F. (2022) "A Case for Play: Immersive Storytelling of Rohingya Refugee Experience." In Alsina P, Mor E (eds). *Proceedings of the 27th International Symposium on Electronic Art (ISEA'22)*. Barcelona, Spain: 10-16 June. In Press.
2022 Xu HS, **LC R**. (2022) "Cohesiveness of Robots in Groups Affects the Perception of Social Rejection by Human Observers." *Proceedings of the 2022 ACM IEEE International Conference on Human-Robot Interaction (HRI'22)*. IEEE Press, 1100-1104. Online.

2022 **LC R**, Ruijters V. (2022) "CHIKYUCHI: In-person/remote game exhibition for climate change influence." *Proceedings of the 16th International Conference on Tangible, Embedded, and Embodied Interaction (TEI'22)*. 81, 1-4. February 13-16, Daejeon, Republic of Korea. ACM, New York, USA. Online.

2022 🏆 **Best Student Paper Award – top 1%**
Song ZJ, Sun Y, **LC R**. (2022) "Narrating Climate Change: Speculative data stories in comic form for affecting climate action." In Lindborg PM (eds). *DACA 2022: Proceedings of Data Art for Climate Action Conference*. Hong Kong: 22-26 February. Online.

2021 Erol Z, Zhang ZY, Uzgunay E, **LC R**. (2021) "SOUND OF(F): Contextual storytelling using machine learning representations of sound and music." In Wölfel M, Bernhardt J (eds), Interactivity and Game Creation. ArtsIT 2021. *Lecture Notes of the Institute for Computer Sciences, Social Informatics, Telecommunications Engineering*. Springer, Cham. Online.

2021 Song ZJ, Sun Y, Ruijters V, **LC R**. (2021) "Climate Influence: Implicit game-based interactive storytelling for climate action purpose." In Mateas M, Lamas D (eds). *Interactive Storytelling ICIDS 2021: Lecture Notes in Computer Science*. Tallinn, Estonia: 7-10 December. Springer, Cham. Online.

2021 Song ZJ, Sun Y, **LC R**. (2021) "Drizzle: A comic for covert climate action influence." In Lee KP, Lou YQ (eds). *IASDR 2021: Proceedings of International Association of Societies of Design Research*. Hong Kong: 6-8 December. Springer, Cham. Online.

2021 Liu HJ, **LC R**, Cormio C, Yu MX, Kim M. (2021) "Designing for Distance Nursing: Reconnecting nursing students with senior home residents during COVID-19." *IASDR 2021: Proceedings of International Association of Societies of Design Research*. Hong Kong: 6-8 December. Springer, Cham. Online.

2021 **LC R**. (2021) "Imitations of Immortality: Learning from Human Imitative Examples in Transformer Poetry Generation." *ARTECH 2021: Proceedings of the 10th International Conference on Digital and Interactive Arts*. 8: 1-9. Aveiro, Portugal: ACM, NYC. Online.

2021 **LC R**, Benayoun M, Lindborg PM, Xu HS, Chan HC, Yip KM, Zhang TY. (2021) "Power Chess: Robot-to-Robot Nonverbal Emotional Expression Applied to Competitive Play." *ARTECH 2021: Proceedings of the 10th International Conference on Digital and Interactive Arts*. 2:1-11. Alveiro, Portugal: 13-15 October. ACM, NYC. Online.

2021 LC R. *Imitations of Immortality*, edited by Zijing Song, 1st ed. Hong Kong: Floating Projects Press 2021, 60 pgs, ISBN 978-988-75664-1-0.

2021 Song ZJ, Sun Y, LC R. *Drizzle*, 1st ed. Hong Kong: Floating Projects Press 2021, 18 pgs, ISBN 978-988-75664-2-7.

2021 🏆 **Honorable Mention Award – top 5%**
Friedman N, Love K, **LC R**, Sabin JE, Hoffman G, Ju W. (2021) "What Robots Need From Clothing." In *ACM Designing Interactive Systems Conference (DIS'21)*. June 28-July 2, ACM, New York, USA, 1345-1355. Online.

2021 **LC R**, and Mizuno D. (2021) "Designing for Narrative Influence: Speculative Storytelling for Social Good in Times of Public Health and Climate Crises." In *CHI Conference on Human Factors in Computing Systems Extended Abstracts (CHI'21)*. May 8-13, Yokohama, Japan. ACM, New York, USA, Article 29, 1-13. Online.

2021 Zamfirescu-Pereira JD, Sirkin D, Goedicke D, **LC R**, Friedman N, Mandel I, Martelaro N, Ju W. (2021) "Fake It to Make It: Exploratory Prototyping in HRI." *Companion Proceedings of the 2021 ACM IEEE International Conference on Human-Robot Interaction (HRI'21)*.

March 8-11, Boulder, CO, USA. ACM, New York, USA. Online.

2021 Friedman N, Love K, Bremers A, Parry AJ, **LC R**, Amgalan B, Liu J, Ju W. (2021) "Designing Functional Clothing for Human-robot Interaction." *Companion Proceedings of the 2021 ACM IEEE International Conference on Human-Robot Interaction (HRI'21)*. March 8-11, Boulder, CO, USA. ACM, New York, USA. Online.

2021 **LC R.** (2021) "Now You See Me, Now You Don't: Revealing personality and narratives from playful interactions with machines being watched." *Proceedings of the 15th International Conference on Tangible, Embedded, and Embodied Interaction (TEI'21)*. 43, 1-7. February 14-17, Salzburg, Austria. ACM, New York, USA. Online.

2020 Liu Y, Si Y, **LC R**, Harteveld C. (2020) "cARd: Mixed Reality Approach for a Total Immersive Analog Game Experience." In: Arai K., Kapoor S., Bhatia R. (eds) *Proceedings of the Future Technologies Conference (FTC) , Vol. 2*. Advances in Intelligent Systems and Computing, vol 1289. Springer, Cham. doi: 10.1007/978-3-030-63089-8_58. Online.

2020 **LC R**, Alcibar A, Baez A, and Torossian S. (2020) "Machine Gaze: Self-Identification Through Play With a computer Vision-Based Projection and Robotics System." *Frontiers in Robotics and AI: Human-Robot Interaction*. 7:580835 (2020). Online.

2020 **LC R**, Zhou S, and Lin L. "Remapping and replay in generative spaces." In: Soddu, C. and Colabella, E. (eds) *GA '20: Proceedings of the 23rd International Conference on Generative Art*. December 15-17, Milan, Italy. 253-268. Domus Argenia, Rome. Online.

2020 **LC R**, Friedman N, Zamfirescu-Pereira JD, and Ju W. (2020) "Agents of Spatial Influence: Designing incidental interactions with arrangements and gestures." *HRI '20 Workshop: The Forgotten HRI: Incidental encounters with robots in public spaces. In 2020 ACM IEEE International Conference on Human-Robot Interaction*. Cambridge UK. Online.

2020 Coutu Y, Chang Y, Zhang W, Sengun S, and **LC R.** (2020) "Immersiveness and usability in VR: a comparative study of Monstrum and Fruit Ninja." In Bostan: *Game User Experience and Player-Centered Design*. International Series on Computer Entertainment and Media Technology: Springer, 437-448. doi: 10.1007/978-3-030-37643-7_20. Online.

2019 **LC R** and Fukuoka Y. (2019) "Machine Learning and Therapeutic Strategies in VR." *ARTECH 2019: Proceedings of the 9th International Conference on Digital and Interactive Arts*. Braga, Portugal: 42, 1-6. ACM, NY. doi:10.1145/3359852.3359908. Online.

2019 **LC R.** (2019) "Secret Lives of Machines." *Proceedings of IEEE ICRA-X Robotic Art Program*. 23-25: Elektra, Montreal, Canada. Online.

2018 **LC R.** "Artistic Intelligence." *Proceedings of International Symposium on Computational Media Art*. 12-19 (2018): City University of Hong Kong School of Creative Media. Online.

2018 **LC R**, Tranquilli M, Wardrop A. "Midi-Rox: A reversible wrap dress to empower one-handed dressing." *Annual Proceedings of the American Occupational Therapy Association*. 120 (2018): New Orleans, US. Online.

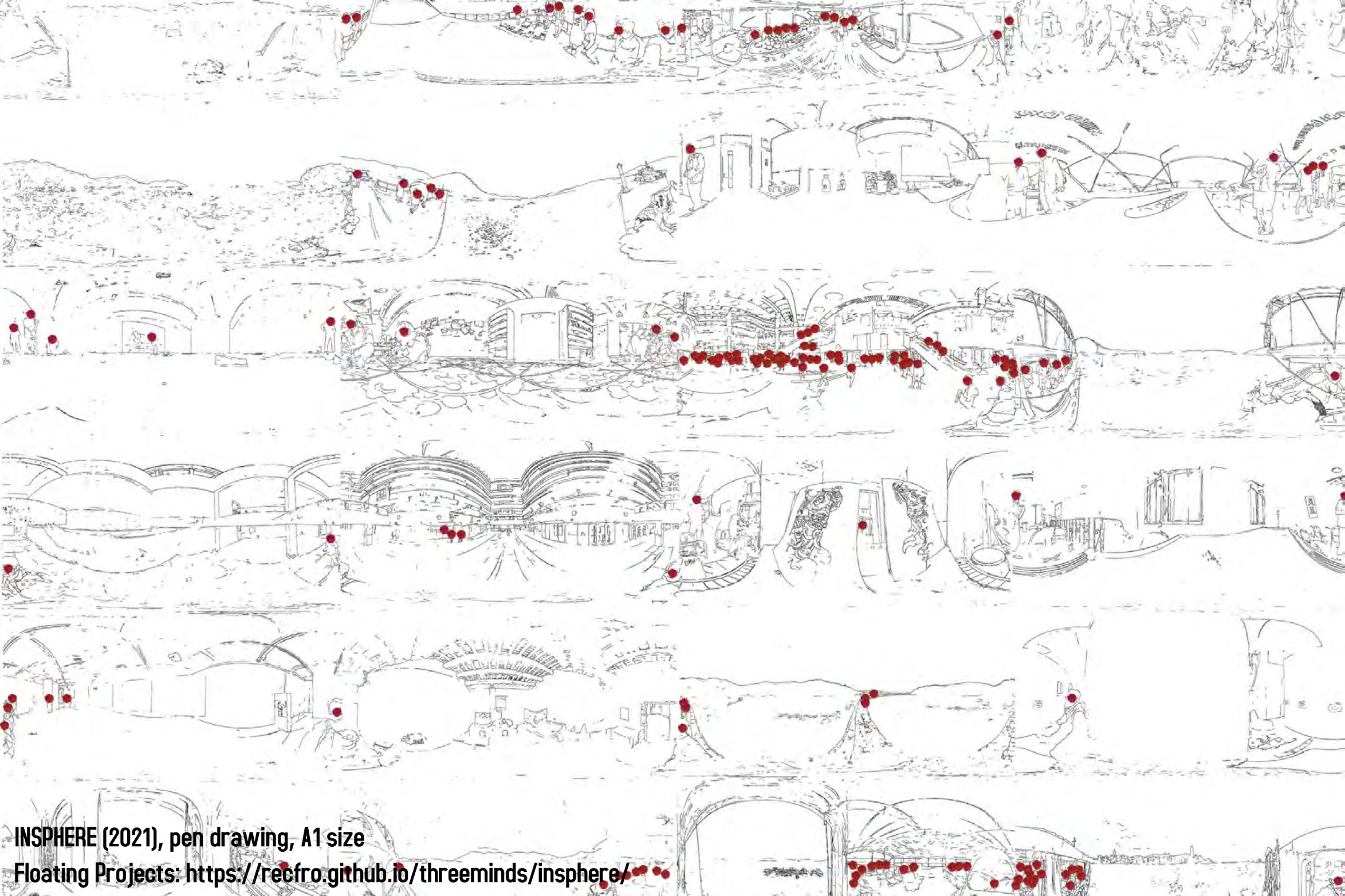
2018 **Luo R***, Uematsu A*, Weitemier A, Aquili L, Koivumaa J, McHugh TJ, and Johansen JP. "A dopaminergic switch for fear to safety transitions." *Nature Communications*, 16 (30087B) (2018). (* - equal contribution) Online.

2012 Dellal SS*, **Luo R***, and Otis TS. "$GABA_A$ receptors increase excitability and conduction velocity in cerebellar parallel fiber axons." *J. Neurophysiology*, 107(11):2958-2970 (2012). (* equal contribution) Online.

2012 **Luo R.** *Fast Times: Excitatory effects of GABA in axonal compartments in the cerebellar molecular layer*. UCLA Interdepartmental Neuroscience Program: (2012). Online.

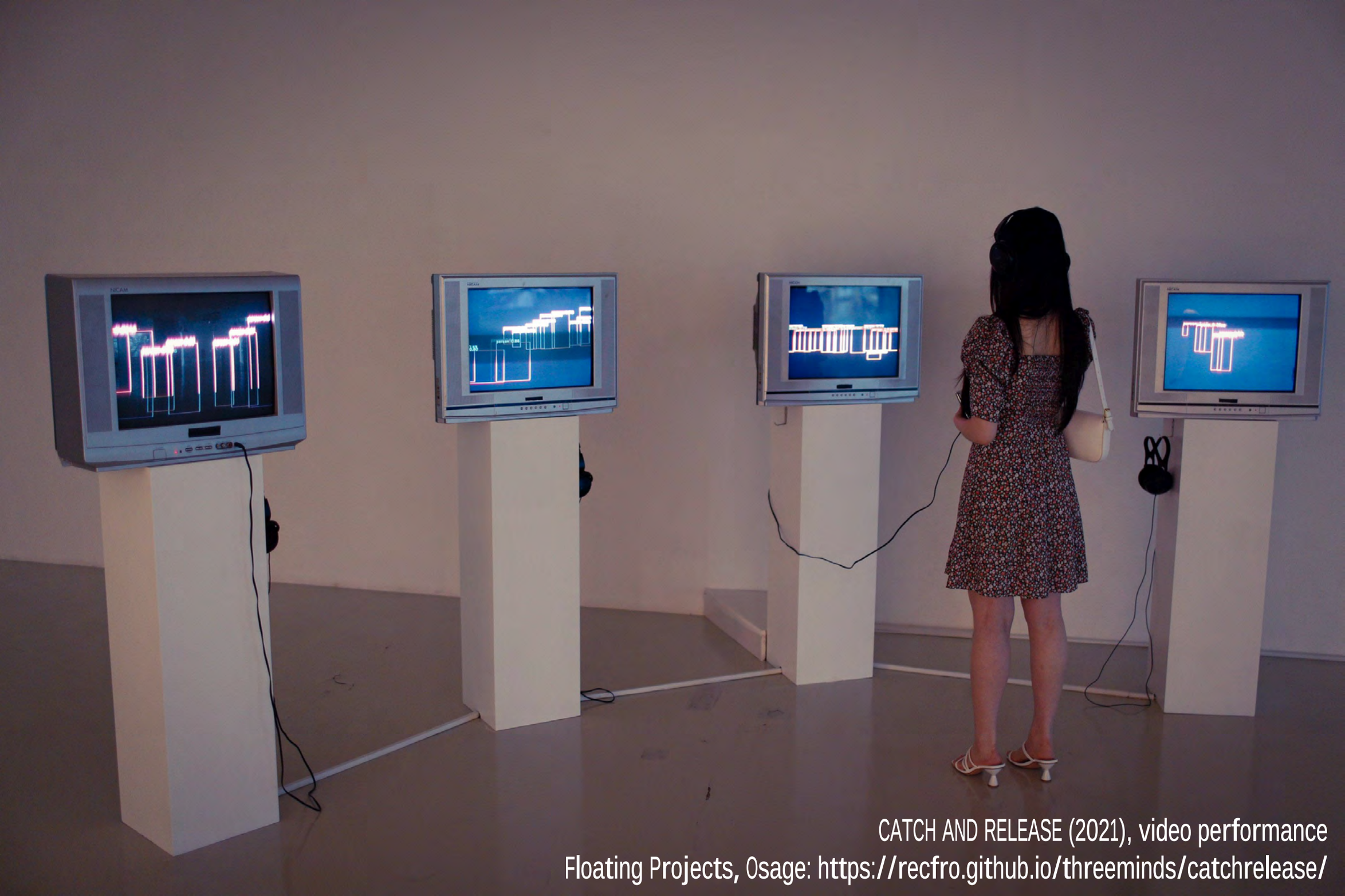
PRESENTATION OF SELF IN MACHINE LIFE (2021), hybrid performance, 17:30
Brick Theatre, NYSCI, CityU HK: https://recfro.github.io/presentation-of-self/

DOWN TO THE HOLOGRAPH (2021), machine learning video installation, 1:00
Ars Electronica: https://recfro.github.io/threeminds/downtotheholograph/



INSPHERE (2021), pen drawing, A1 size
Floating Projects: https://recfro.github.io/threeminds/insphere/

DRIZZLE (2021), manga newspaper print
ICIDS, Floating Projects: https://recfro.github.io/drizzle/



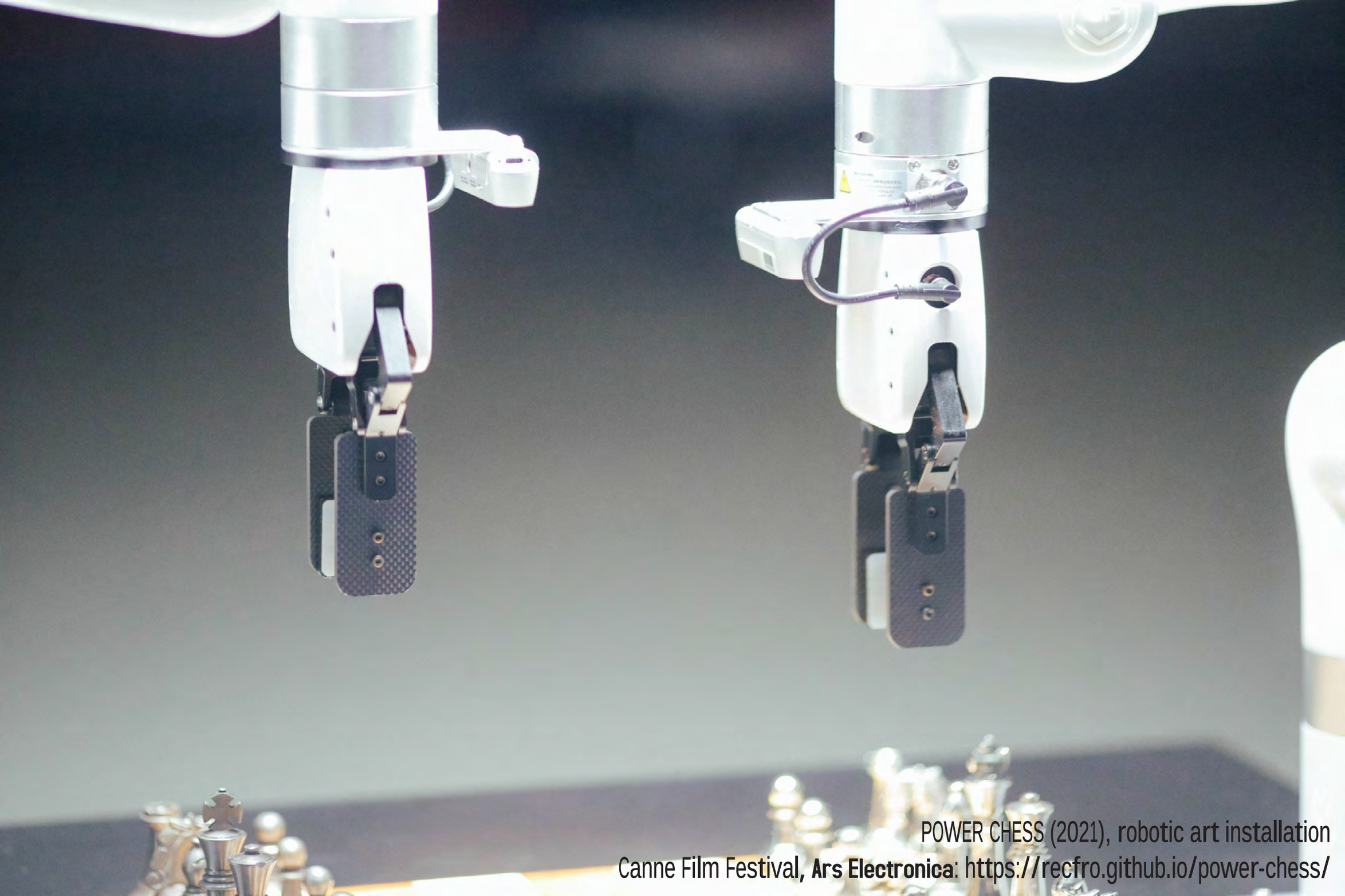
CATCH AND RELEASE (2021), video performance
Floating Projects, Osage: https://recfro.github.io/threeminds/catchrelease/

HOME ALONE (2021), video projection wood frame
Jockey Club Creative Arts Centre:
https://recfro.github.io/threeminds/homealone/

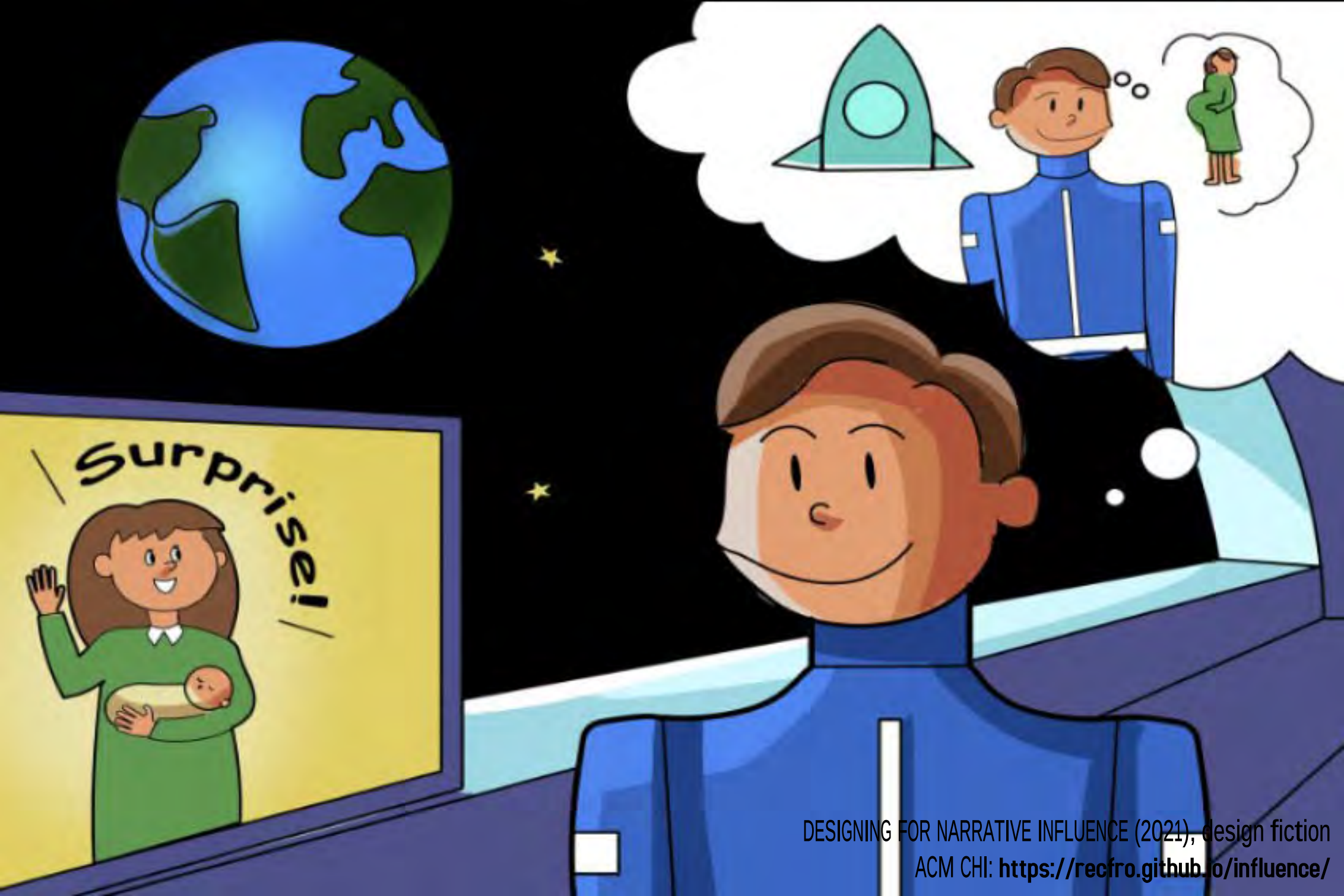
SOUND OF(F) (2021), VR installation

Osage Gallery: **https://recfro.github.io/threeminds/soundoff/**

CHIKYUCHI (2021), wood and electronics
Geidai Museum, Art Machines 2: https://recfro.github.io/chikyuchi/

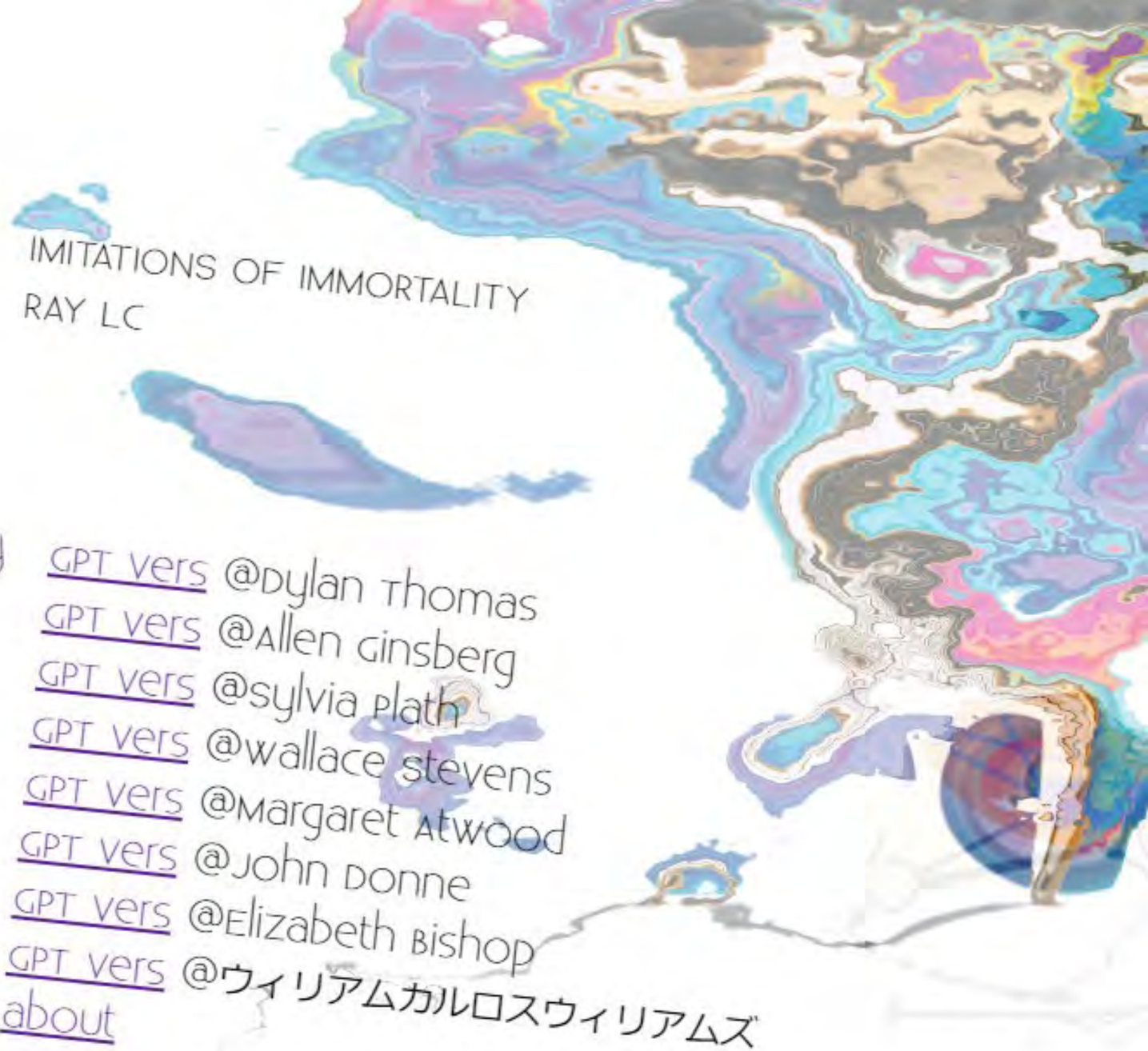


POWER CHESS (2021), robotic art installation
Canne Film Festival, **Ars Electronica**: https://recfro.github.io/power-chess/

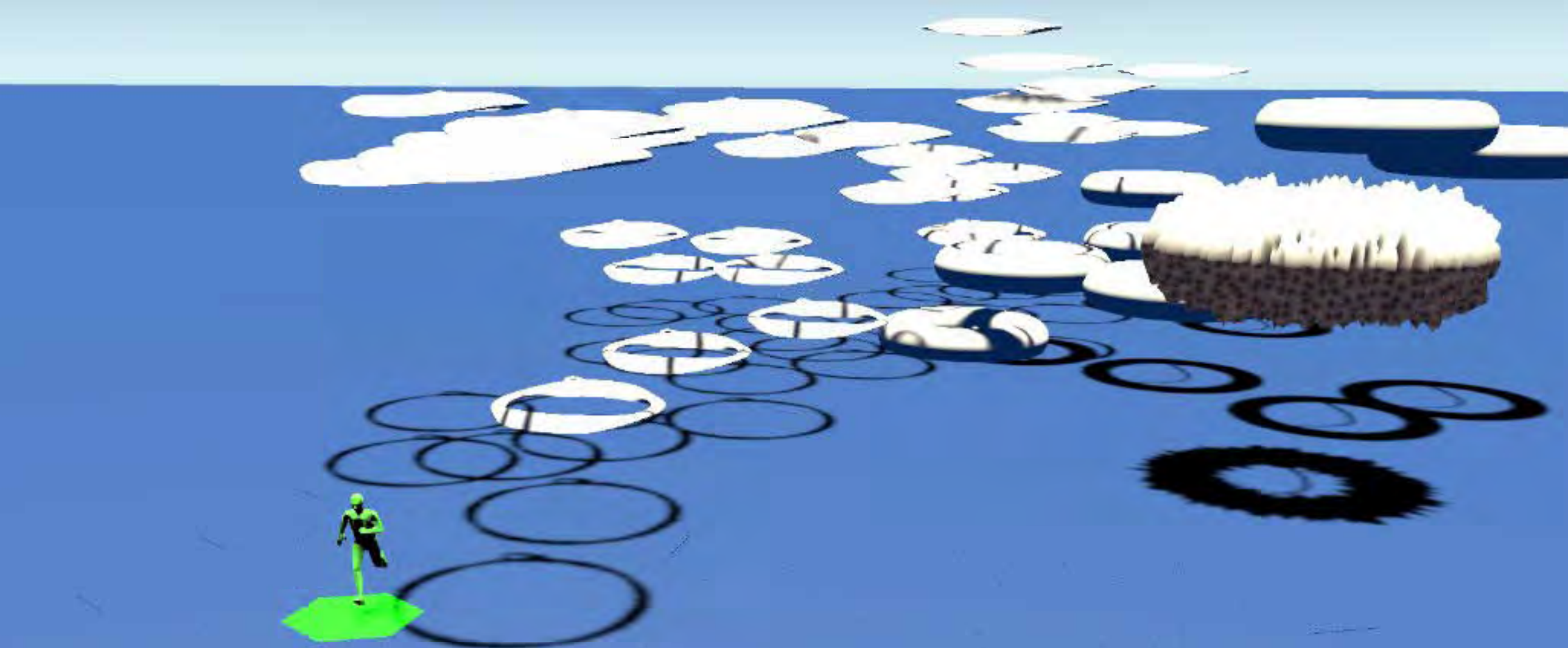


DESIGNING FOR NARRATIVE INFLUENCE (2021), design fiction
ACM CHI: **https://recfro.github.io/influence/**

NETWORK INTELLIGENCE (2020), video installation, **12:10**
CICA Museum: https://recfreq.wordpress.com/portfolio/flora-network-intelligence/



IMITATIONS OF IMMORTALITY (2020), web installation
NeurIPS: https://vimeo.com/476549956

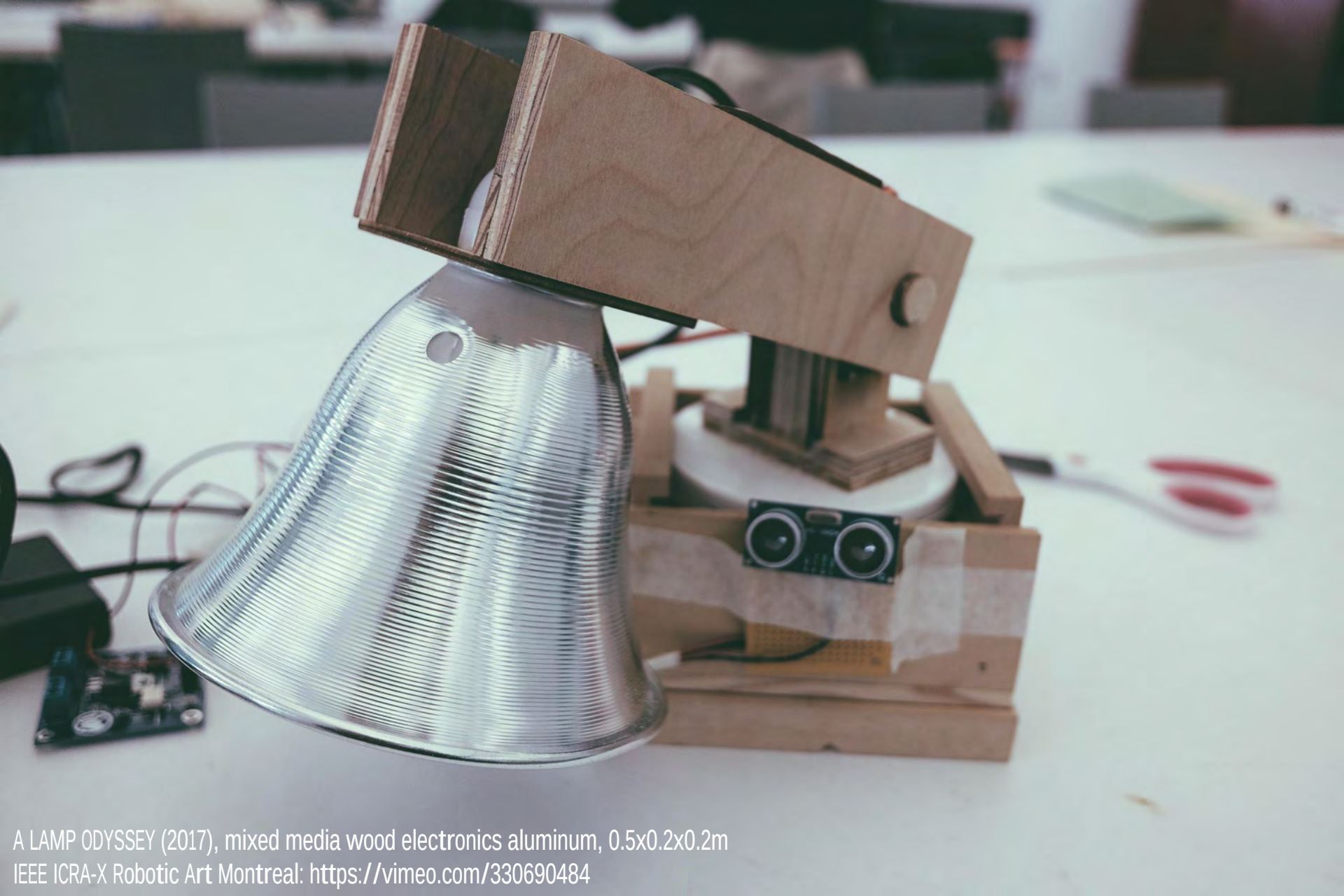


NAVIGATING IN PLACE (2020), web installation
Generative Art 2020, **Saari**: https://recfro.github.io/navigating-in-place/

DECERTAINFY (2020), video installation, 5:25
Burning Man BRCvr: https://youtu.be/Zz67HIZXLp8

THE SKIN OF OUR SHEATH (2020), VR-physical performance, 9:18
New Museum EdgeCut: https://vimeo.com/394947962

MACHINE GAZE (2019), robot projection installation, 3x5x8m
New York **Hall of Science**: https://youtu.be/kVoqkzZT4IQ



A LAMP ODYSSEY (2017), mixed media wood electronics aluminum, 0.5x0.2x0.2m
IEEE ICRA-X Robotic Art Montreal: https://vimeo.com/330690484

SECRET LIVES OF MACHINES (2017), mixed media wood electronics plastic, 0.6x0.6x0.3m
Creative Tech Week NYC: https://youtu.be/b8IiAWU8XXM

ARTISTIC INTELLIGENCE (2018), mixed media electronics plaster, 0.3x0.3x1m
Art Machines ISCMA City University HK: https://youtu.be/fCf6rx2enDc

LOOK AT ME, THINK OF ME (2018), electronics two-way mirror wood, 4x4x2m
Parsons Major Major Exhibit: https://youtu.be/nm0smr_ct6E

FLORA (2019), mixed media projection, 5x5x5m
CICA Museum: https://youtu.be/gylnW-4XWKY

PRISMATIC (2021), exhibition curation, Floating Projects:
https://fabcityu.wordpress.com/portfolio/prismatic-an-exhibition-at-floating-projects/

I'M ALWAYS HERE (2021), art exhibition
Osage Gallery: https://recfro.github.io/threeminds/osage/

I WAS OF THREE MINDS

I WAS OF THREE MINDS (2021), exhibition curation
JCCAC: https://recfro.github.io/threeminds/floating/

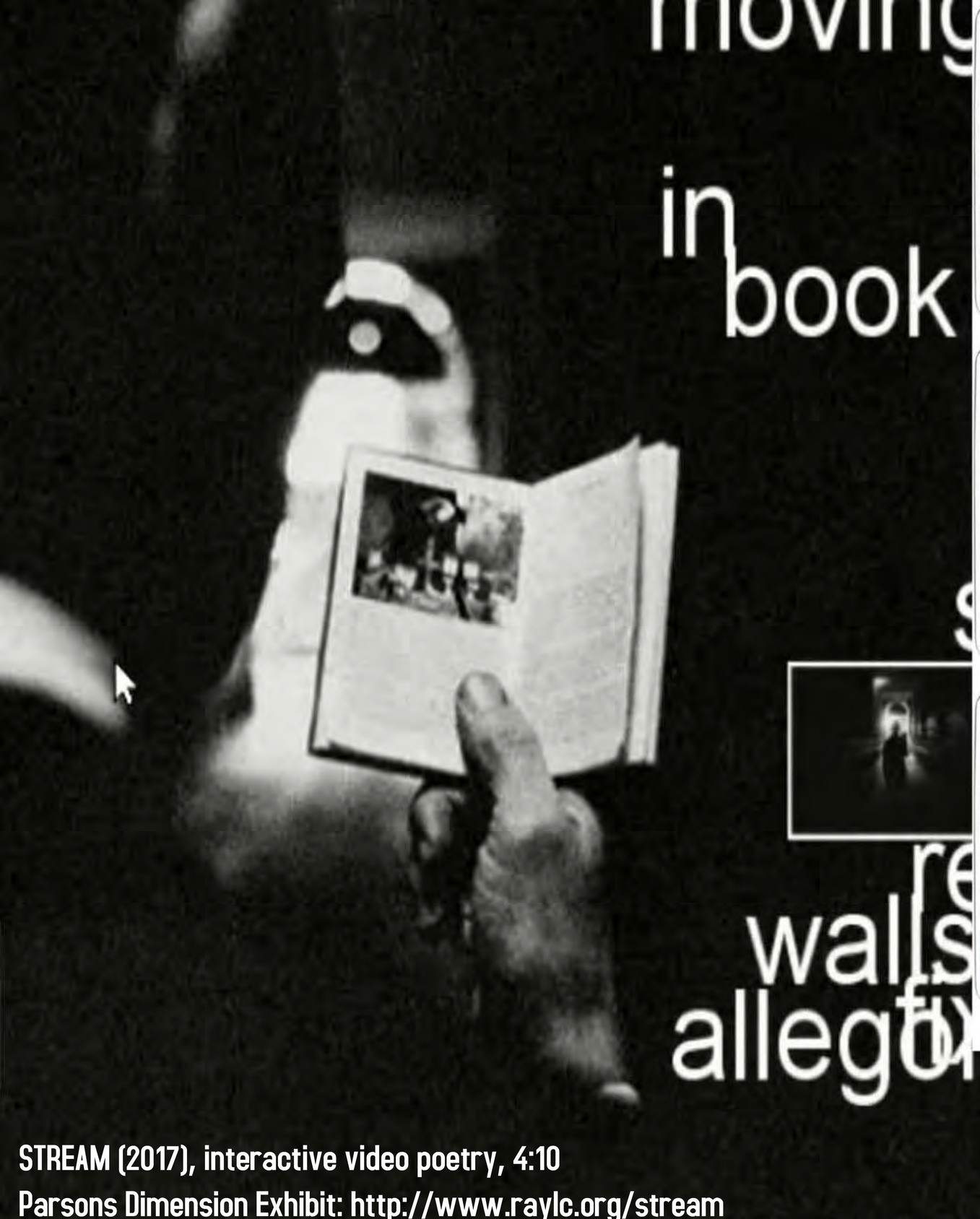
DIS/PLACED (2020), online performance curation, 15:00
Elektron Tallinn: https://vimeo.com/593548674/6c7b5ef5b6

MIMICRY OF HOLLOWS (2021), art exhibition
5th Floor Tokyo: https://www.the5thfloor.org/mimicryofhollows

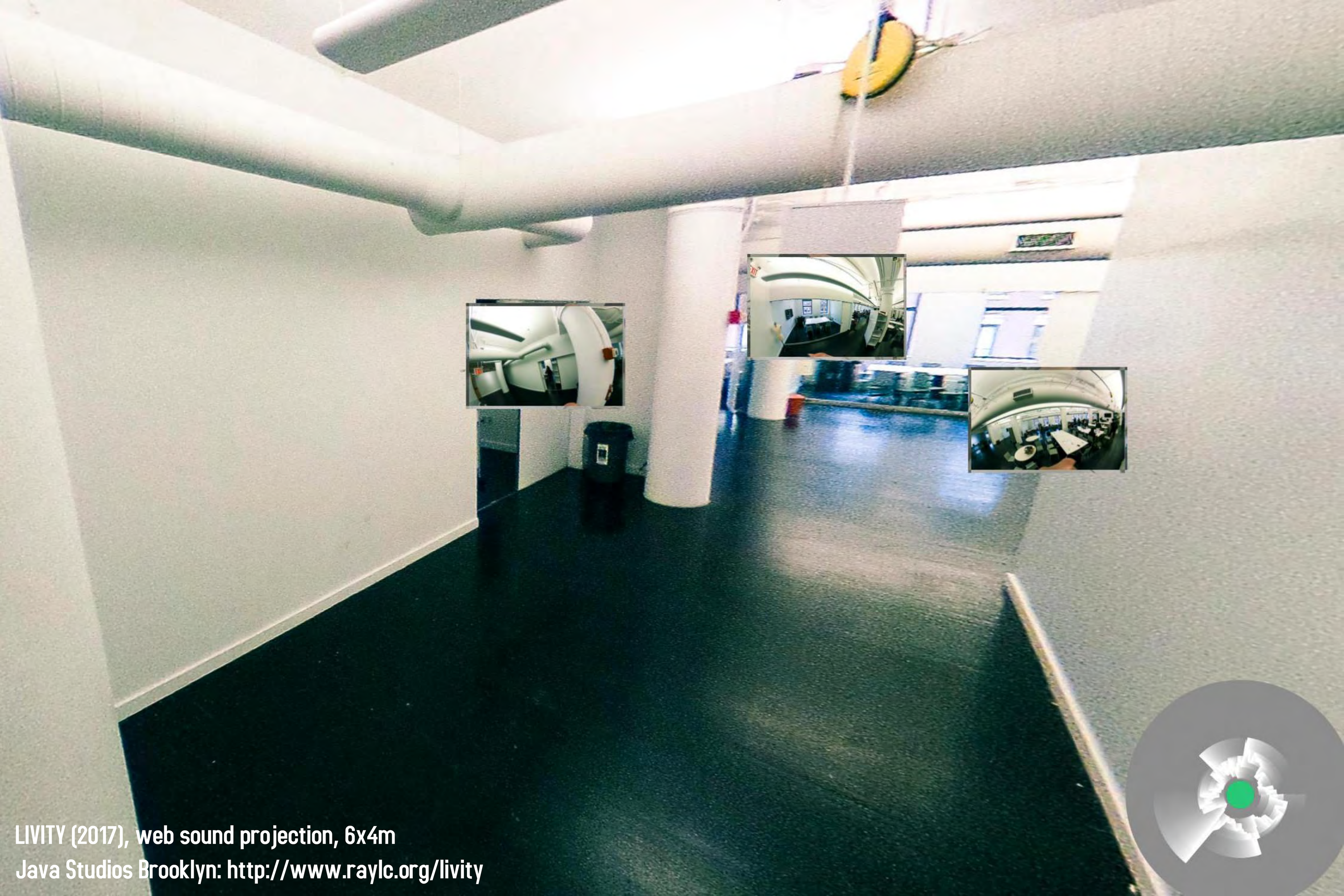
TECHNOLOGY AND SOCIAL GOOD (2019), exhibition curation
Columbia University, I-House: https://raylc.org/exhibits/techgood/

ROHINGYA IN VR (2019), virtual reality, 05:00
Ars Electronica Linz: https://youtu.be/idn45nT54kw?t=69

SHAMIMA: MEMORY IN MY HEART (2019), film, 04:20
NYC Short Documentary Film Festival: https://youtu.be/y4zuTVrcvQw



STREAM (2017), interactive video poetry, 4:10
Parsons Dimension Exhibit: http://www.raylc.org/stream



LIVITY (2017), web sound projection, 6x4m
Java Studios Brooklyn: http://www.raylc.org/livity

G[AR]MENT (2018), electronics vinyl crinoline dress, 1.2x1.2x0.8m Pratt Brooklyn Fashion Tektiles Exhibit: https://youtu.be/00ycqRVfGQs

CREATIVE FLOW (2019), boiled fabric electronics performance, 1x0.4x0.2m
DeConstrukt Redhook NY: https://vimeo.com/327750846

INUS (2017), electronics vinyl dress, 1.8x0.3x0.2m
Tokyo MODE New Era Show: http://www.raylc.org/inusfashion

THIRD SKIN (2016), painting fashion performance, 30:10
Tokyo Golden Egg Kabukicho: https://youtu.be/E0DuRgCHPAY

TEACHING.

Instructor: RAY LC.
Assistant Professor of Creative Media.
City University of Hong Kong School of Creative Media.

[teaching | video]
[recfro.github.io | studio]

INTRODUCTION.

> The big mistake in schools is trying to teach children anything, and by using fear as the basic motivation: fear of getting failing grades, fear of not staying with your class.
>
> - Stanley Kubrick

I believe that students learn best when they are allowed to discover what they are learning about. In one classic experiment conducted by Aronson and Carlsmith, children were either prohibited from playing with a certain desirable toy amongst a set of alternatives, or given mild warning against it. Children exposed to the strong reprimand continued to play with that toy when experimenter were away, while those given the mild warning internalized the message and played with it less than other toys, even ranking it overall lower in desirability. Thus, they were intrinsically motivated to reject the toy because it seems like it's their own choice, not the directions of a supervisor. This suggests that students should also be allowed to make their own choices in knowledge discovery, motivated by their own intrinsic rewards rather than extrinsic factors. The role of the teacher is that of an informant, who shares some "inside" knowledge with the students, who are ultimately responsible for forming their own conclusions. Conclusions reached this way will be well consolidated and serve students throughout their careers because they have made a well-informed, critical choice.

In accordance with this philosophy, my teaching has focused on providing knowledge that is always qualified by what is known by current technology and based on what my own understanding is. Students are given to understand the limitations of certain approaches are asked to form their own judgment based on knowledge discovery. Lectures are given together with breaks for discussions in group work that allow students to reflect, argue, and form conclusions about the material presented. This is usually followed by a demo or hands-on section that allows students to actively participate in the knowledge creation rather than passively absorbing it. I also strive to keep students engaged in the material by using humor, multimedia, and personal relevance. Only if students care about the material and how it would affect their everyday lives will they be interested in forming judgments about it. If they are motivated to know it, half the battle is won. In accordance, my teaching has about giving students the inspiration to create and test while providing resources for continual support.

This paradigm is in line with my own neuroscience research, which has discovered a role for reinforcement-based circuits (dopamine) in non-reinforcement tasks such as recovery from trauma. In my own research, we find that fear is only a temporary motivation: when the shock is no longer there, we don't need to avoid it anymore. Reinforcement-based strategies are not useful for the reward itself, but rather to develop habits that lead to long-term motivation. One

can think of the reward as guide-points that take students to where they want to explore. The combination of reinforcement and discovery-based learning lead students to find their own way to the goal, but to enjoy the process of getting there, not the grade given at the end. What my neuroscience expertise in fear and reward has taught me: we don't reward the end point, we reward the process of experimenting, failing, and tinkering that converts an extrinsic task during learning into an intrinsically motivated task people enjoy doing. These intrinsic tasks may end up being designing, making, presenting, or storytelling, etc.

MENTORSHIP.

My anti-disciplinary, radically in-depth practice brings unconventional and previously unthought-of collaborations to bear, such as bringing movement technologists to the dance class scene, teaching VR to refugees in camps, bringing neuroscientists to work on an installation about psychological narcissism, practice the process of paper submission for design and making, and teaching public dance in the context of creative technology. In the classroom and with students I mentor, I instill this sense of *anything is possible* feeling that unleashes in them designs and implementations that cross boundaries, because they can see for themselves eye-to-eye another being who has confronted the walls of *you cannot do* and pushed through the cracks and emerged with new opportunities and connections to share with them.

These ideas hold true in lab and mentorship settings as well. In both situations in the past, I have provided students with transdisciplinary, appealing, and relevant ideas that are subject to qualifications, but have found students and mentees who take subjects to the next level, working on their own projects and doing further research because they find it rewarding and relevant. I endeavor to get them interested in the process of research, to enjoy the rewards from dissemination of results, and providing a social environment conducive to motivated work. Trainees at UCLA included Vivy Tran (now Albert Einstein College of Medicine), Mariam Al-Hamad (now Georgetown Med school), and Tinsley Huo (now Parsons). At Northeastern, I've supervise a usability of VR games project that is published in Springer (students Ysabelle Coutu, Wendi Zhang, and Yangyuqi Chang), as well as a VR for social anxiety project that is was incubated in Idea Venture Accelerator program (students Rudra Trivedi and Sai Teja Konda). At City University of Hong Kong, I mentor three PhD students from diverse backgrounds of curation, design technology, and game design (Lillian Song, Lina Zhang, and Hongshen Xu). I supervised MFA students, including the renowned dancer Hao Yang, who turned his studio project work into a comedy-dance performance at Shanghai's 1862 Art Center. I also advise extensively BS students who make bioart (Chunxi Tracy Liu), study human-drone interactions (Zhiyuan Alan Zhang), and do machine learning art (Jingwei Anton Zhang). In the virtual space, I mentor students online on supervised projects, including those from diverse places like Politecnico Milano (Hongni Ye), UC Berkley (Daisy Chen), Harvard School of Design (Aria Bao), and Middle East Technical University Turkey (Zeynep Erol).

RECENT ACHIEVEMENTS.

Using a hybrid art and science approach to human-computer interaction education, I designed and implemented a new 6 unit course curriculum for Human-Machine Interaction combining art and science for motivation of interdisciplinary students, reflecting the need for art and technology education in Hong Kong. It is the first course of this type: course proposal.

To foster remote distance learning environments for engaging students from City University of Hong Kong School of Creative Media with state-of-the-art design and fabrication education from the renowned Parsons School of Design through an intimate online empathetic collaboration format for the MFA digital fabrication curriculum, I created a course with Parsons and experimented with remote interaction strategies to replace Zoom (such as Ohyay, Mozilla hubs, gather.town), and presented a paper at Digitally Engaged Learning (A) about a story-driven approach to engage remote learning of physical-presence-based fabrication techniques: Digitally Engaged Learning (DEL) conference.

I procured a Teaching Development Grant for working with remote interactions with students, which is new in its attempt to blend synchronous and asynchronous learning for online and offline methods: Telepathic Construction.

A recent effort involves promoting scholarly research from exceptional students. I found that certain groups of students in class were creating works that go beyond the demands or boundaries of the course (Physical Computing), and that these students also usually do not care about their grades, but end up asking many curious questions beyond just the course material. Hence in the second iteration of the course, I decided to invite students to publicize their own research, providing mentorship on how to write and present work for publication as an optional activity. The result was published at ACM IDC: 2021 ACM Interaction Design and Children: "KOMI: smart toy for feline pets." (video presentation). Such undergrad student participation is significant and seldom seen in education at our school. A creative video was made by the students to narrate the story of the design through their own view (and their own cat!).

COURSES TAUGHT.

SM5345	Research Through Making, fall 2021, City University of Hong Kong
SM3713	Human-Machine Interaction, spring 2021, City University of Hong Kong
SM2716	Physical Computing & Tangible Media, spring 2021, City University of Hong Kong
GNSD 6240	Exploratory Concept Design, spring 2020, Northeastern University
GNSD 6320	Psychology of Play, spring 2020, Northeastern University
GNSD 3800	Game Concept Development Production, spring 2020, Northeastern University
GNSD 6340	Biometrics for Design, fall 2019, Northeastern University
GNSD 5130	Mixed Research Methods, fall 2019, Northeastern University
GNSD 6330	Player Experience, fall 2019, Northeastern University
PGTE 5410E	Design Technology Bootcamp, summer 2019, Parsons School of Design
PUFA 4310	Core Studio Senior Thesis 2, spring 2019, Parsons School of Design
PUCD 2125	Core Lab Interaction, spring 2019, Parsons School of Design
PUCD 2035	Creative Computing, fall 2018, Parsons School of Design
PGTE 5410C	Design Technology Bootcamp, summer 2018, Parsons School of Design
LE204	Basics of Life Science, spring 2016, Waseda University
SE16S	Seminar in Medical Careers, spring 2016, Juntendo University
E8006	Lectures on Life and Medical Sciences A1, fall 2016, Doshisha University
LE204	Basics of Life Science, spring 2015, Waseda University
IPSE24ZL	Molecular Cell Biology, fall 2015, Waseda University

SM15	Advanced Topics in Medical Science, fall 2015, Saitama Medical University
SE15F	Seminar in Medical Research, fall 2015, Juntendo University
E8006	Lectures on Life and Medical Sciences A1, fall 2015, Doshisha University
SE14S	Seminar in Scientific Research, spring 2014, Juntendo University
LE204	Basics of Life Science, fall 2014, Waseda University
SE14F	Seminar in Scientific Research, fall 2014, Juntendo University
LS2	Cells, Tissues, and Organs, winter 2010, University of California Los Angeles
CHEM110A	Chemical Thermodynamics, fall 2010, University of California Los Angeles

SELECTED ADVISING.

2021-current	Zhiyuan Zhang – BS human-drone interactions in machine learning systems.
2021-current	Coco Chan – BS smart toys for pets designed from pet's point of view.
2021-current	Lina Zhang – PhD designing robotic gestures for influence in social groups.
2021-current	Zijing Song – PhD narrative design for influencing climate change action.
2021-current	Hongni Ye – MFA active vs. passive immersive strategies for refugee experience.
2021-current	Hao Yang – MFA performance of self-dialogue using immersive installation.
2021-current	Tatia Pui Wan Lau – MFA projected environments for storytelling.
2021-current	Kasin Fong – MFA narrative virtual environment for spatial musical exploration.
2020-current	Houjiang Liu – MA designing for nursing interactions with older adults in covid.
2020-current	Hongshen Xu – PhD social rejection and bullying of human by machines.
2019-2020	Erin Brenneman – MA design of emergency evacuation for elderly in VR, online.
2019-2020	Jiaqi Tian – BFA 360 video with interactive 3D assets for storytelling, video.
2018-2020	Xinyun Chen – MA 360 video and VR simulation of emergency situations, online.
2018-2020	Yuxuan Liu – MFA OpenBCI EEG for live VR interactions in art installations, press.
2019-2020	Ysabelle Coutu – MS immersion of VR in game compared to 2D analogue, online.
2019-2020	Yunbo Yang – MS creating physical controllers for flight simulators in VR.
2019-2020	Sai Teja Konda – MS using positive rewards to treat social anxiety in VR, idealab.
2019-2020	Rudra Trivedi – MS development for VR emulation of stressful situations, idealab.
2019-2020	Sonya McCree – MS effect of AI-based voice on free form text input walking sims.
2018-2019	Yue Zhang – BFA archaeology of refugee experiences in native lands, nymedialab.
2015-2016	Noah Miller – RA dopamine voltammetry in nucleus accumbens, online.
2014-2016	Yanqiu Tao – kakenhi grant on generalization in dopamine PTSD project, online.
2013-2015	Lindsay Laurie – kakenhi grant on surgical procedures for dopamine, online.
2010-2012	Vivy Tran – URP calcium signaling in parallel fibers while evoking GABA, online.
2009-2011	Mariam Al-Hamad – RA effect of voltage sensors on neural firing, online.
2009-2010	Patty Araj – microcircuit grant voltage sensors for Purkinje excitability, online.

RESEARCH.

Studio for Narrative Spaces.
Investigator: RAY LC.
Current Members: Hongshen Xu, Lillian Song, Lina Zhang, Marco Lui.

[instagram | press]
[recfro.github.io | studio]

INTRODUCTION.

> This is a word we use to plug
> holes with. It's the right size for those warm
> blanks in speech, for those red heart-
> shaped vacancies on the page that look nothing
> like real hearts.
>
> - from *Variations on the Word Love*, by Margaret Atwood

What Atwood narrates about the commodification of our vocabulary is found in academic and public discourse. This includes keywords to ease understanding and catch phrases to economize trends: big data, AI, art tech, interdisciplinary, etc. What words cannot capture is the full depth of what it takes to embody the practice. Take "interdisciplinary": it is not enough to collaborate with other fields or experts; interdisciplinary scholarship in its most engaging form is working in the new field with fresh eyes, doing the day-to-day activities that come with that practice.

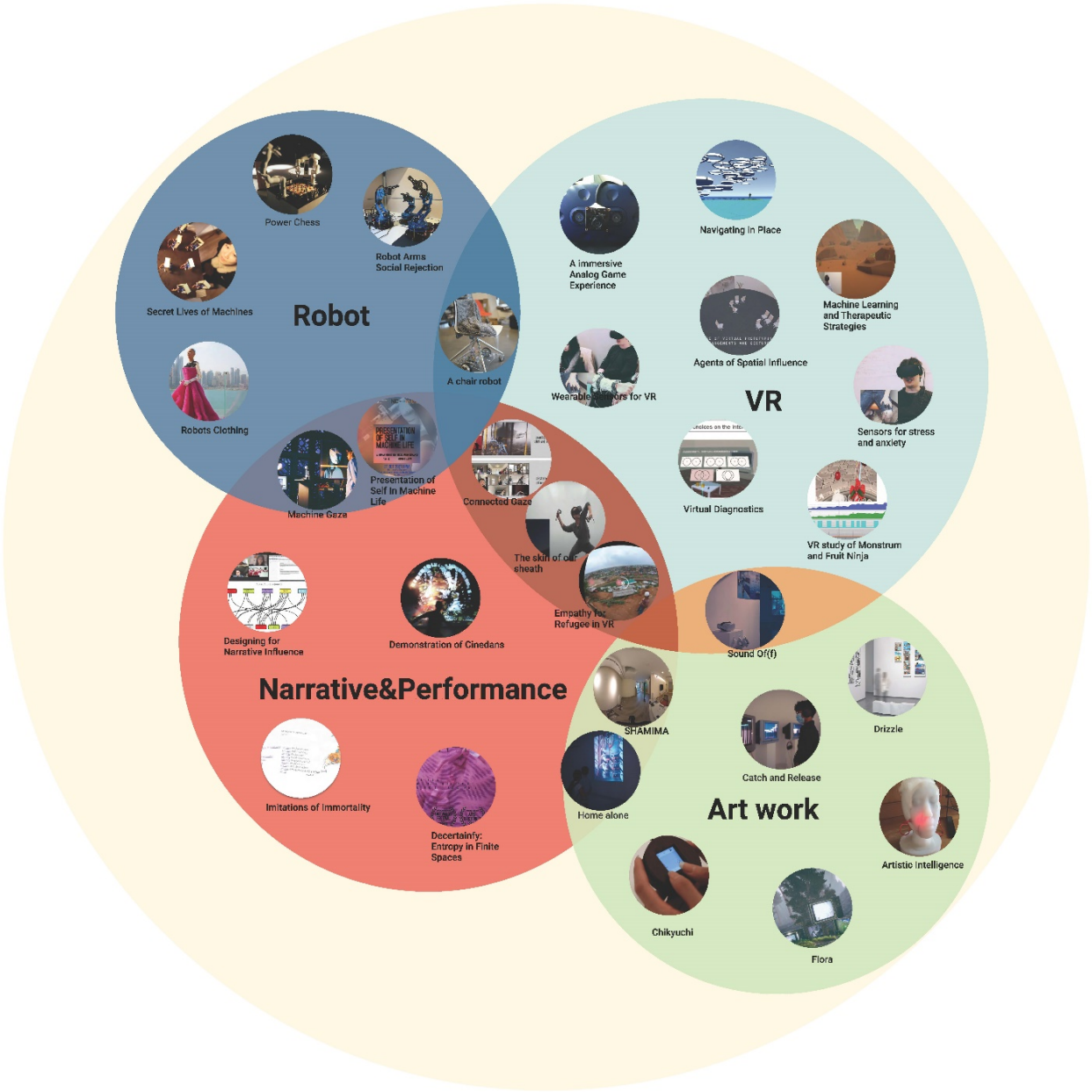
For the artist who imagines science to be a logical and technically advanced, she joins a lab to see how stories are told in publishing, how compromises are reached between technologies that are feasible and studies that are not possible. For the scientist who believes art to be whims of illogical emotionality and results of get-famous schemes, she apprentices herself to the master who forges her own path through constant failures and experiments with audience reactions, to experience how an artwork is constructed from insights from psychology.

While grad student of neuroscience at UCLA, I wrestled with these questions, before a chance encounter with choreographer David Roussève changed my life. I was interviewing him about his new show *Saudade* for the Daily Bruin newspaper. When the topic of how to get classically trained ballet and contemporary dancers to configure their movements to West African and Indonesian motifs, he told me the big secret: he got the dancers to forget their past training by immersing in the new environment fully before allowing them to use their previous language at all. And thus it is with my own interdisciplinary work: forget one's own neuroscience practice and immerse oneself in artistic practice before gaining the internalized insight to communicate and experience in both fields of work, discussing with equal facility outcomes and limitations with a scientist, and designs and themes with an artist. This in-depth journey has led me to the commonality amongst fields, that they all tell stories to activate human engagement. No matter scientist or artist, we are all in our core storytellers.

With these insights in mind, I established an experientially interdisciplinary studio to investigate *the way modifications of physical and virtual spaces affect human perception and behavior, in the context of the way people frame interactions with machines in narrative form*.

RESEARCH OBJECTIVES.

Traditional media rely on one-directional influences such as a video or book to evoke emotional responses, but interactive media instead rely on the participant's own intrinsic motivation to affect the experience, creating a more immersive experience that is also more likely to affect actionable changes. These interactive strategies lie at the core of our fascination with the way humans collaborate with, and are influenced by, machines in the context of the environment. This research lies at the forefront of technologies involving smart homes, artificial intelligence, immersive media (VR), and robotics, but its foundation is audience perception of the stories these technologies tell us, for every new interaction is a narrative about what is possible, and how our own interpretations and behaviors can be shaped by them.



As such we investigate the way humans interact with technologies collaboratively in different spatial and narrative contexts through four main lenses of overlapping research efforts. Our previous publications and research outputs focus on these four main aspects of environmental and machine influences, utilizing physical and augmented setups to accomplish our goals.

ART-TECHNOLOGY EXHIBITION MODELS FOR AUDIENCE INTERACTION.

We create artistic installation interventions for human-machine spatial interaction, leading to both exhibition and scholarly outcomes. In 2020-2021 alone, this has resulted in works such as those exhibited internationally at New York Hall of Science (Presentation of Self in Machine Life, Machine Gaze), Ars Electronica (Down the Holograph, Rohingya VR experience), Osage Gallery (Home Alone, Sound Of(f), Catch and Release), Tokyo University of the Arts (Chikyuchi), City University of Hong Kong (Chikyuchi), 5th Floor Gallery Tokyo (Mimicry of Hollows), Jockey Club Creative Arts Centre (Insphere, Flora, Artistic Intelligence, etc), Generative Art Conference (Navigating in Place), NeurIPS (Imitations of Immortality), Burning Man BRCvr (Decertainfy), Elektron Tallinn (dis/placed), New Museum (The Skin of Our Sheath), NYC Short Documentary Film Festival (Shamima), CICA Museum (Network Intelligence), Floating Projects (I was of Three Minds, VR choreography), NeON Digital Art Festival (Rohingya), Columbia University (curating Tech for Social Good). The works are based on technologies and environments such as VR storytelling, robotic art, machine learning, and tangible interactions with projections, and how they affect human capabilities, interpretations, and behaviors in interacting with machines.

On-going projects include Sound Of(f) (ArtsIT) on machine learning-based spatialization of sound for telling the story of a dreamscape; I Was of Three Minds a set of three machine learning generated pieces that cross the media of VR, projection, and CRT video; Unvoiced a work that translates between human and machine language by using computer vision coupled to a multi-segmented large scale set of interactive silicone-based mouths, etc.

Key Publications:

- Erol Z, Zhang ZY, Uzgunay E, **LC R**. (2021) "SOUND OF(F): Contextual storytelling using machine learning representations of sound and music." In Wölfel M, Bernhardt J (eds), Interactivity and Game Creation. ArtsIT 2021. Springer, Cham. In Press.
- **LC R**. (2021) "Imitations of Immortality: Learning from human imitative examples in transformer poetry generation." *ACM ARTECH 2021: Proceedings of the 10th International Conference on Digital and Interactive Arts*. Aveiro, Portugal. ACM, NYC.
- **LC R**, Zhou S, and Lin L. "Remapping and replay in generative spaces." In: Soddu, C. and Colabella, E. (eds) *GA '20: Proceedings of the 23rd International Conference on Generative Art*. December 15-17, Milan, Italy. 253-268. Domus Argenia, Rome. Online.
- LC R. *Imitations of Immortality*, edited by Zijing Song, 1st ed. Hong Kong: Floating Projects Press 2021, 60 pgs, ISBN 978-988-75664-1-0.
- Song ZJ, Sun Y, LC R. *Drizzle*, 1st ed. Hong Kong: Floating Projects Press, 2021, 18 pgs, ISBN 978-988-75664-2-7.
- **LC R.** (2019) "Secret Lives of Machines." *Proceedings of IEEE ICRA-X Robotic Art Program*. 23-25: Elektra, Montreal, Canada. Online.

Key Contributors:

- RAY LC, Marco Lui, Zijing Lillian Song (curator).

CONTEXTUAL NARRATIVE DESIGN FOR SOCIAL GOOD.

We collaboratively design narrative in interactive environments like game play, collaborative storytelling, and participatory design for influencing human perception and behavior for social purpose such as climate change action, evaluating these narrative designs in semi-structured interview and survey forms. This has resulted in work using a Tamagotchi story game to affect player's caretaking in climate change context, applying manga to affect social good action, using machine learning to generate text with narrative purpose, collaborative writing workshops for purpose, story-based game play for educating senior residents during Covid, designing hand-operated washing machines in rural India for water shortage, designing a one-handed dress for an immobile older adult living with one-sided disability due to stroke.

On-going unpublished projects include Data Narration of Climate Change (DACA) on data-based storytelling for climate influence; Narrative Voice-based Dating (CHI) study with Dr. Zhicong Lu (CityU CS) on framing narratives based only on voice on the Chinese dating app Soul; Storytelling Aging and Technology (CHI) study with Dr. Xin Tong (Duke Kunshan) on roles of young adults and the elderly in technology use; Skin of Our Sheath (ACM TEI) with Mizuho Kappa on VR performance for changing audience narrative expectation.

Key Publications:

- Song ZJ, Sun Y, Ruijters V, **LC R**. (2021) "Climate Influence: Implicit game-based interactive storytelling for climate action purpose." In Mateas M, Lamas D (eds). *Interactive Storytelling ICIDS 2021: Lecture Notes in Computer Science*.
- Song ZJ, Sun Y, **LC R**. (2021) "Drizzle: A comic for covert climate action influence." In Lee KP, Lou YQ (eds). *IASDR 2021: Proceedings of International Association of Societies of Design Research*. Hong Kong: Springer, Cham.
- **LC R**. (2021) "Imitations of Immortality: Learning from human imitative examples in transformer poetry generation." *ACM ARTECH 2021: Proceedings of the 10th International Conference on Digital and Interactive Arts*. Aveiro, Portugal.
- **LC R**, and Mizuno D. (2021) "Designing for Narrative Influence: Speculative Storytelling for Social Good in Times of Public Health and Climate Crises." In *CHI Conference on Human Factors in Computing Systems Extended Abstracts (CHI'21)*
- Liu HJ, **LC R**, Cormio C, Yu MX, Kim M. (2021) "Designing for Distance Nursing: Reconnecting nursing students with senior home residents during COVID-19." *IASDR 2021: Proceedings of International Association of Societies of Design Research*. Springer.

Key Contributors:

- RAY LC, Zijing Lillian Song, Miso Kim (collab), Daijiro Mizuno (collab).

GESTURES AND TOOLS FOR HUMAN-MACHINE COLLABORATION.

We study machine movement gestures to affect human perception and behavior from a human-computer interaction perspective, using both physical and virtual testing strategies for submission to HCI venues. This has resulted in work investigating perception of robot-robot dynamics during game play, signaling robot personality through appearances like clothing, using robotics to aid self-identification psychologically, investigating multi-robot signalling with observers, prototyping strategies using video and VR for human-robot interaction.

On-going unpublished projects include Social Rejection in Robot-Robot-Human Interaction

(HRI), using video and robot arms to study how group dynamics affect interpretation of being rejected by robots; Fashion for Devices (alt HRI) on designing for human interpretation of the gaze of security cameras using fashion and appearance; AI as Active Writer (ACM IUI), with Dr. Toby Li (Notre Dame) on human perception of collaborative expressive machine writing agent on a digital platform; Presentation of Self in Machine Life (CHI) on human-machine dance performance through virtual and physical telepresence and expressive gestures of a robot arm; Select (CHI Play) on moral responses of game characters; Connected Gaze (CHI) on audience-machine collaboration using interactive gestures in telepresence spaces for performing arts.

Key Publications:

- **LC R**, Benayoun M, Lindborg PM, Xu HS, Chan HC, Yip KM, Zhang TY. (2021) "Power Chess: Robot-to-robot nonverbal emotional expression applied to competitive play." *ACM ARTECH 2021: Proceedings of the 10th International Conference on Digital and Interactive Arts*. Alveiro, Portugal: 13-15 October. ACM, NYC.
- Friedman N, Love K, **LC R**, Sabin JE, Hoffman G, Ju W. (2021) "What Robots Need From Clothing." In *ACM Designing Interactive Systems Conference (DIS'21)*. June 28-July 2.
- **LC R**, Alcibar A, Baez A, and Torossian S. (2020) "Machine Gaze: Self-Identification Through Play With a computer Vision-Based Projection and Robotics System." *Frontiers in Robotics and AI: Human-Robot Interaction*.
- **LC R.** (2021) "Now You See Me, Now You Don't: Revealing personality and narratives from playful interactions with machines being watched." *Proceedings of the 15th International Conference on Tangible, Embedded, and Embodied Interaction (TEI'21)*.
- Zamfirescu-Pereira JD, Sirkin D, Goedicke D, **LC R**, Friedman N, Mandel I, Martelaro N, Ju W. (2021) "Fake It to Make It: Exploratory Prototyping in HRI." *Companion Proceedings of the 2021 ACM IEEE International Conference on Human-Robot Interaction (HRI'21)*.

Key Contributors:

- RAY LC, Hongshen Xu, Toby Li (collab).

VIRTUAL AND AUGMENTED ENVIRONMENTS IN COLLABORATIVE EXPERIENCE.

We apply digital (VR, AR) and physical environments to human collaborative experiences, enhancing human-machine collaborative work, inducing empathetic responses, rehabilitating human mental concerns, or empowering marginalized voices in 360. This has resulted in work looking at how human-robot interactions change based on seating arrangement, mixed reality approaches to active game play, VR spaces for systematic desensitization therapy approaches in speech therapy, comparison of digital and physical interventions in augmented spaces, using immersive filmmaking to empower refugee voices in the Rohingya population in Bangladesh.

On-going unpublished projects include Configuration of Space (CSCW), with Dr. Zhicong Lu (CityU CS) on the way digital spaces like Ohyay uses configurations and spatial arrangement to change human-human collaboration and drives changes in perception; Virtual Diagnostics (CHI), with Dr. Julian Lai (CityU Psychology) on the use of VR games and biometrics to assess potential fear of intimacy and isolation mental disorders in youth populations; Empathy for Refugee in VR (CHI), on using active navigation in exploring refugee environments for fostering empathy; Weaved Wearable Sensors for VR (ACM TEI), using tangible wearable components for detecting stress and anxiety in VR-based rehabilitation; PostiVR (CHI), with Dr. Stefan Hofmann (BU),

applying reinforcement-based game-play strategies to treat social anxiety in VR scenarios.

Key Publications:

- **LC R**, Friedman N, Zamfirescu-Pereira JD, and Ju W. (2020) "Agents of Spatial Influence: Designing incidental interactions with arrangements and gestures." *HRI '20 Workshop: The Forgotten HRI: Incidental encounters with robots in public spaces. In 2020 ACM IEEE International Conference on Human-Robot Interaction*.
- Liu Y, Si Y, **LC R**, Harteveld C. (2021) "cARd: Mixed Reality Approach for a Total Immersive Analog Game Experience." In: Arai K., Kapoor S., Bhatia R. (eds) *Proceedings of the Future Technologies Conference (FTC)* , *Vol. 2*. Advances in Intelligent Systems and Computing, vol 1289.
- **LC R** and Fukuoka Y. (2019) "Machine Learning and Therapeutic Strategies in VR." *ARTECH 2019: Proceedings of the 9th International Conference on Digital and Interactive Arts*. Braga, Portugal: 42, 1-6.
- Coutu Y, Chang Y, Zhang W, Sengun S, and **LC R.** (2020) "Immersiveness and usability in VR: a comparative study of Monstrum and Fruit Ninja." In Bostan: *Game User Experience and Player-Centered Design*. International Series on Computer Entertainment, Springer.
- **LC R**, and Monir F. (2021) "A Case for Play: Immersive Storytelling of Rohingya Refugee Experience." *Media-N Journal of the New Media Caucus. Issue on NEoN Digital Arts Re@ct Social Change Art Technology*. Dundee, UK. In Press.

Key Contributors:

- RAY LC, Lina Zhang, Zhicong Lu (collab), Julian Lai (collab).

SUMMARY.

RAY LC's practice creates interaction environments for building bonds between humans and machines. He takes perspectives from his own research in neuroscience (pubs in Nature Comm, J. Neurosci, J. Neurophys) and in HCI (pubs in CHI, DIS, HRI, TEI, Frontiers, etc) in his artistic practice, with notable exhibitions at BankArt, 1_Wall, Process Space LMCC, New York Hall of Science Residency, Saari Residency, Kyoto Design Lab Residency, Kiyoshi Saito Museum, ICRA Elektra Montreal, ArtLab Lahore, Ars Electronica Linz, NeON Digital Arts Festival, New Museum, CICA Museum, NYC Short Documentary Film Festival, Burning Man, NeurIPS, Deconstrukt, Angewandte Festival, Elektron Tallinn, Floating Projects, Jockey Club Creative Arts Centre, Osage Gallery.

RAY comes from Cal Berkeley EECS-Math (BS), UCLA Neuroscience (PHD), Parsons School of Design (MFA). His current work uses artistic interventions to probe our spatial relationship with machines. He has been awarded by the National Science Foundation, National Institutes of Health, Japan Society for the Promotion of Science, Verizon Connected Futures, Adobe Design Award, Microsoft Imagine Cup, Kone Foundation, Davis Peace Foundation, NY Foundation for the Arts, Hong Kong Arts Development Council.