Arts x Tech Lab 2021

NATIONAL ARTS COUNCIL
SINGAPORE

The Arts x Tech Lab 2021 is the National Arts Council (NAC)'s inaugural innovation lab that fosters collaboration between the arts and technology sectors. The Lab is designed to empower creatives, artists and technologists to engage in innovative experiments and collaborations. It also aims to build capabilities, co-drive innovation and support changemakers from within the arts and technology sectors.

The Lab is co-designed by technology partner Keio-NUS CUTE Center, which provides technology mentorship and consultancy to the participants of the Lab, and managed by NAC.

ABOUT THE LAB

PROLOGUE

CASE STUDIES

KEY LEARNINGS

EPILOGUE

INDEX

Prologue

The Lab's Focus

The collaboration between artists and technologists can present new possibilities.

Technology is becoming a big part of our everyday lives, from helping us to become more connected with one another to opening new frontiers for industries. Arts and technology have also come together in many ways. Even before the COVID-19 pandemic, artists have been using technology as a medium for art creation and presentation. The pandemic has accelerated the need to harness technology as artists look to technology solutions to help them stay connected with audiences amidst the need for safe management measures such as the cancellation of live performances. But technology has the potential to do more – from helping artists to expand both their domestic and international audience base, to improving the sustainability of arts organisations by helping them become more cost-effective operationally and creating new revenue streams.

Recognising the importance of technology to the arts sector, the National Arts Council (NAC) has organised various arts and technology symposiums in the past. Through surveys and anecdotal feedback, it learnt that many artists were excited about the potential synergies between these two domains and what they could do for their practice. NAC then decided to take its support for technology in the arts to another level with the inaugural Arts x Tech Lab (the Lab).

After more than a year of planning and engagement with cultural and technology experts, the inaugural edition of the Lab was launched in 2021. For eight months, 10 Artist x Technologist teams seeded new ideas, built prototypes, tested and improvised their ideas through a trial-and-error process. A playground for individuals of varying artistic and technology disciplines, backgrounds, skillsets and perspectives, the Lab is a safe place for participating artists and technologists to learn from one another to transform their practice.

"We see the Lab as a starting point that allows ideas to be tested and incubated, and we started the Lab with the knowledge and expectation that some of these ideas could continue on that journey of development even after the Lab is over," says the management team. In the long run, Lab hopes to build capabilities, co-drive innovation and support change-makers from within the arts and technology sectors meaningfully, aligning with the Council's strategic priority to leverage technology as an enabler for art-making and audience outreach.

Members of the
organising team
from NAC

Meet the Team

1/ NAC, *Organiser*

The NAC team behind The Lab comprised individuals with different skillsets and backgrounds, including coordinators and commissioners of large-scale art events. Every individual brought different perspectives to the design and implementation of the Lab, thereby shaping the Lab and the selected projects in a manner that is relevant to the respective sectors.

2/ Keio-NUS CUTE Center, *Technology Partner*

As the co-designer of The Lab, the Keio-NUS CUTE Center provided technology mentorship and consultancy to the participants and NAC team, through workshops which addressed processes, approaches and considerations in technology projects. They also suggested ways to bridge and facilitate effective communication and collaboration between technologists and artists.

"We were excited that the Lab focused on the experimentation and learning journey of every project team, instead of focusing on a fixed set of Key Performance Indicators. This allowed the teams a platform for experimentation, to try out new ideas, make mistakes, and ultimately learn from them," says Keio-NUS CUTE Center who offered invaluable perspectives and advice on how the Lab could be designed to ensure each participant benefits from it.

Stakeholders and Experts

The following stakeholders and partners generously offered their time and counsel to help the participants of the Lab. They posed critical questions to help the teams refine their ideas, and encouraged them to anticipate potential challenges and consider alternative approaches to strengthen the innovation process and prototypes.

1/ National Museum of Singapore (National Museum)

The National Museum emphasises innovation and actively seeks opportunities to incorporate technology into its museum spaces and programmes. Seeing the importance of Arts x Tech collaborations in a heritage setting, the National Museum posed three of the six challenge statements for the Lab, and was deeply involved in the three projects that focused heavily on heritage and museum experiences.

"The Lab served as a great platform for us to get to know emerging creatives and technologists in Singapore and to work with them in a meaningful way, and through this, to allow for fresh ideas and approaches to engaging with Singapore heritage to be developed," says the curatorial and exhibitions team.

2/ Expert Panellists

A total of nine panellists were involved in the selection of the 10 participating teams through the Open Call process. They also provided critical feedback and helpful advice to all teams at important milestones.

3/ Other Advisors

Infocomm Media Development Authority (IMDA), DesignSingapore, National Heritage Board, National Gallery Singapore and Esplanade – Theatres on the Bay
As this was the first innovation Lab organised by NAC, the advice, perspectives and suggestions from these organisations were helpful in ensuring that the Lab was relevant and meaningful for the participants.

4/ Potential Adopters

NAC was intentional in cultivating like-minded stakeholders from the culture, creative sector and the technology sector, to learn more about the projects and pique their interests as potential adopters and future collaborators or commissioners who could take the projects to their next stage of development.

Open call & Networking: (February – April 2021)

The Lab put out an open call for the submission of ideas and proposals as well as organised two networking activities. 10 teams were selected by the expert panel comprising artists and technologists.

Phase 1: Early Development (May – July 2021)

Group activities, workshops and peer sharing sessions were organised to help the 10 teams refine their ideas, scope of work and budget proposal in preparation for the mid-point sharing.

Mid-point : sharing (July – August 2021)

At the mid-point sharing stage, the teams presented their refined ideas and budget proposal to the expert panel who provided feedback and recommendations for the teams consideration before they moved on to the prototype development.

Phase 2: Development – From Idea to Prototype (August – December 2021)

The teams moved on to develop the refined ideas into prototypes or work-in-progress products through continued guidance from the Lab. The Lab culminated in the teams sharing their experience through a showcase event.

Post-Lab

NAC has encouraged the 10 teams to explore post-lab possibilities for their prototype with like-minded stakeholders and adopters. Some teams have explored working with arts and heritage institutions, arts organisations, presenting platforms and new collaborators to bring their prototypes to the next stage of development. Others have connected with interested stakeholders to share their innovation journey with others.

How Does the Lab Work?

The Lab took on an "ideas-first" model, which meant that the first three months before the start of the project were solely dedicated to the refinement of ideas, clarification of project scope and budget planning. This gave the participants ample time to consider their ideas. Subsequently, the overall structure was kept linear yet fluid and customisable to the pace of each team.

Challenge Statements
The Lab focused on supporting arts-technology ideas and proposals across six challenge statements, addressing topics such as reimagining artistic practice, developing creative solutions to connect people from different communities, blending artistic and heritage experiences, and bringing new perspectives to the national collection of the National Museum of Singapore.

Each participant addressed one of the six challenge statements:

Track 1 - Open

• With the current pandemic forcing artists to think about delivering arts to audiences, how will technology help you reimagine your practice and find new ways to reach audiences both in live and virtual settings?

• What creative solutions can art and technology offer to connect people from different generations, cultures, abilities or languages?

• What is the art/performance space of the future? How can this be integrated to enhance or re-imagine the experience of a space, or even a city?

Track 2 - National Museum of Singapore

• How can new digital media and technology be employed to blend artistic experiences and heritage?

• How can technology offer audiences and visitors new perspectives in experiencing the National Collection?

• How can technology and the arts enhance museum-based learning and discussions?

Case Stud

ies

The Folko team
testing the features
of the mobile app

The team's discussion notes

Folko: Storytelling Reimagined

Folko is an audio-based app that elevates storytelling and the experience of listeners

About
Folko is an audio-based, publicly available app that reimagines the spoken word through shared storytelling. Storytellers are invited to cowrite stories through shortform audio chapters by submitting content based on their preferred themes. Listeners can also tune in and discover interconnected narratives

People
1. Christian Teo, Creator & Founder Melody Koh, UX Designer
2. Kelly Rahardja, Graphic Designer
3. Hafiz Umar, Flutter Software Developer

Motivation
With a passion for telling stories, Folko's founder Christian Teo volunteered as a docent for the National Museum of Singapore and saw synergies between his vision for Folko and the museum guide programme. "What docents do is to tell stories, and what Folko does is get people to tell their stories," he says. He pitched the idea to the team at the National Heritage Board but due to limited resources, he was unable to create a prototype that could showcase all the features he had in mind.

Project
Folko explored the creation of niche "story channels" for organisations such as the National Museum of Singapore. The experience of *The day Sang Nila Utama stepped into a time machine* was reimagined through Folko.

Where visually-intensive platforms sacrifice authenticity for virality, Folko uses audio to amplify the immediacy and intimacy of emotive storytelling. Where podcasts and audio platforms prefer 'closed door' expert monologues, Folko celebrates creative collaboration and stories from the 'man on the street'. The street-friendly user experience and rapid story-recording sessions allow storytellers to easily partake in stories on the go.

linktr.ee/folkos

What's Next
Folko seeks to carve a space where storytellers are nurtured, feel safe to share their experiences and celebrate global audiences. With the release of its 'open beta' in December 2021, the team continues to welcome voices and perspectives across generations and backgrounds.

Recording a sample story to test the audio-based app.

The team's mixed reality
specialist, sound designer, writer
and illustrator in discussion.
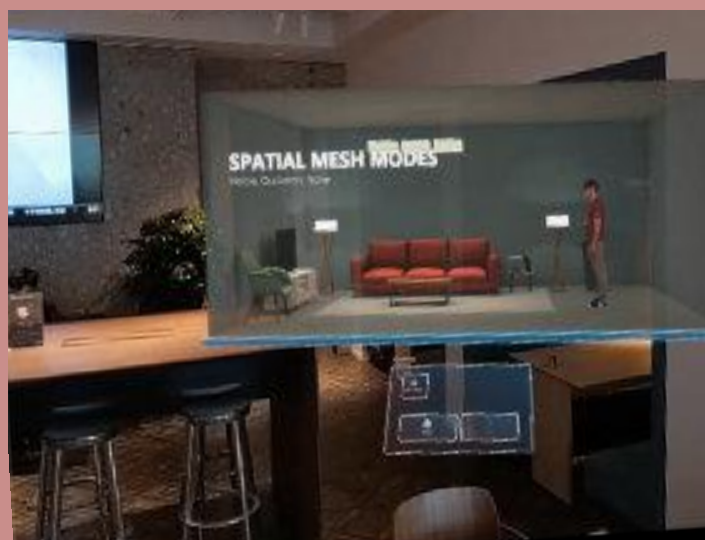
A view of 3D holograms in
mixed reality

One of the team members
trying out the HoloLens

The Colonel & The Hantu

Through immersive technologies, Tusitala reinvents the experience of poetry and illustration.

About

The Colonel and the Hantu is a mixed reality experience that incorporates immersive sound, projection mapping and large-scale panoramic illustration. It is structured around a poetic monologue based on the story of Farquhar[1] ascending Fort Canning Hill, as recorded in the Hikayat Abdullah[2]

People

1. Tusitala Books (Christine Chong | Producer, Evelyn Ang | Project Manager, Amirah Kamis | UX Designer, Vaibhav Sidapara | Technical Lead)
2. d&b audiotechnik Asia Pacific (Royston Tan | Audio System Engineer)
3. HelloHolo (Chen Kai Yi | MR Specialist)
4. Ng Xiao Yan, Illustrator
5. Guo Ningru, Sound Designer
   Ng Yi-Sheng, Writer

Motivation

The concept stemmed from the team's interest in panoramic graphic novels and historical panoramas. Graphic novels are a popular form of literary arts given their visual appeal, and they have long been used to tell complex histories. The team was curious about how such stories could be experienced digitally, through augmented or virtual reality.

They also studied panoramic murals which are common in European museums, especially for depicting scenes of war. They began considering the use of Mixed Reality (MR) to view stories as different layers over the same landscape. A panorama's wide lens naturally provides space for telling multiple stories through the perspectives of different characters, which is important as history is multi-faceted. In addition, the team felt that the heightened sense of immersion could bridge the psychological distance people often feel between them and events of the past.

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1. William Farquhar: Lieutenant-Colonel William Farquhar (1774-1839) served as the first Resident of Singapore from 1819 to 1823. Under his leadership, the port city prospered. However, Farquhar faced many difficulties. He had to deal with plagues of rats and centipedes, and at one point was stabbed in the chest by a madman. In the end, he was fired from his post by Stamford Raffles. Until his death, he claimed to have been the founder of Singapore, but never gained the reputation he desired.

2. *Hikayat Abdullah: Hikayat Abdullah* (Stories of Abdullah) is an autobiography of Abdullah bin Abdul Kadi, who served as Stamford Raffles' interpreter and scribe and was also known as Munsyi Abdullah. Written between 1840 and 1843, and first published in 1849, the book is regarded as a major Malay literary work and an important record of sociopolitical developments in Singapore and Melaka during the early 19th century

Project

Responding to the challenge statement on blending digital media and technology with artistic experiences and heritage, the team visited the National Museum to see its collection and spaces. They then sought to conceptualise a large-scale, immersive installation that would present scenes from Singapore's history across a panoramic landscape at the Glass Rotunda. They created a prototype based on a poem and mural, using Microsoft HoloLens 2, projection mapping, and immersive audio. The idea was to present multiple narratives against a single backdrop, through extended reality (XR) technology.

Find out more

https://www.tusitalabooks.com/project/colonel-and-hantu

What's Next

The project aims to present history and literary works in ways that hold more mass appeal. It also seeks to consider how narrative storytelling can be brought into public spaces like how the visual and performing arts often are, including underutilised indoor spaces such as corridors and stairwells with curved or slanted walls. Through this, it hopes to spur more conversations about creative possibilities among writers, book illustrators, graphic nts, and arts commissioners.

Character sketches of the story of Farquhar ascending Fort Canning Hill

The team in a
discussion about
actuators

A member of
the team at his
work desk

Modular Action & Reaction Control System (MARCS)

MARCS is a programmable ecosystem of modules designed for artistic projects.

About
MARCS refers to Modular Action and Reaction Control System (MARCS). It is a programmable ecosystem of modules designed for rapid prototyping of artistic projects involving the control of actuators.

People
1. Bao Songyu, Maker and Designer
2. Alina Ling, Interaction Designer
3. Justin Ong, Hardware and Software Engineer

Motivation
As an artist, Bao Songyu has been looking to make his works more interactive by incorporating technology. However, he realised that although existing tools make it easy to get started, scaling up and building more complex work requires one to have a firm grasp on a number of engineering fields. Bao thus collaborated with Justin Ong, a technologist, to develop a generic system for controlling a network of motors. The Arts x Tech Lab offered a unique opportunity for the team to explore the feasibility and usefulness of their proof of concept.

Project
MARCS aims to streamline and simplify the use of electronic hardware, allowing non-technical users to independently integrate actuators into their work.

A key feature of the MARCS platform is providing a framework for communication across multiple actuator nodes, allowing data to flow seamlessly through the network. This enables users to scale the control of sensors and actuators in interactive devices and installations, while reducing the friction of setup and troubleshooting. MARCS is also designed with the possibility for integration with existing tools that artists may already be familiar with. Two works, *Entropy* and *Moving Heads*, were built as test applications for the hardware and software prototypes of MARCS.

What's Next
The team aims to develop more hardware and software solutions to cater to solving various issues when creating interactive works. For example, they team may develop waterproof motor and light modules in order for outdoor usage. They seek to use hardware, software and mechanical designs to cater for custom solutions for arts practitioners.

One of the test applications of MARCS, a gesture-controlled headband which controls lighting movement

The team testing
the calibrated hand
gesture interface
for digital drawing

A user view of the hand
gesture calibration process

Speak Your Mind

Digital tools that empower non-speaking children to express themselves

About
speak your mind encourages creative self-expression, the sharing of thoughts and stories, as well as meaningful interaction with peers and the community amongst children with special needs.

People
1. Chan Li Ping, Prototype Designer and Educator
2. Ng Fong Yee, Artist and Educator

Motivation
When they first met in 2019, Chan Li Ping and Ng Fong Yee were artists in residence at *PEEKABOO!*, a festival held at the Rainbow Centre. They observed and worked with children with autism spectrum disorder (ASD) in their classrooms for over a month. They saw first-hand how challenging it was for ASD children to communicate. Existing augmentative and alternative communication (AAC) devices were not easy for them to use. The children struggled with finding the words to say something, and would give up if it took too long or if the other party did not understand what they meant to say.

Chan and Ng felt that there should be more opportunities for tech experimentation and development within the special needs community. Inspired by Look to Speak, a quick communication tool where the user can simply use their eyes to select words, they wanted to explore the possibilities for non-speaking children to express their thoughts and communicate more intuitively.

Project
The project focused on creating digital tools for alternative communication and expression, and resulted in two prototypes:

1. **A calibrated hand gesture interface for digital drawing**
   Using only the webcam on a computer or laptop, the user is able to calibrate two simple hand gestures to select colours and draw on the screen.
2. **Add-on for Augmentative and Alternative Communication [AAC] app**
   The add-on plays a supporting role in communication. It is informed by machine learning and word prediction to help the user speedily find the right words to express a thought.

The process was guided by the interactions and responses of a group of children, and focused mostly on existing tech and software, such as a laptop's in-built webcam to allow for testing without having to buy or fabricate additional hardware. A series of online and hands-on experience sessions were then conducted with these participants to test the prototypes.

https://makingdo.github.io/index.html

What's Next
To develop digital tools for alternative communication and expression available to the special needs community. The thought process, materials, tools and results from the experience sessions will be published as open-source information for the wider community to build upon.

Testing the remote accompaniment format with the musicians

The audio team and performers testing the Soundscape Technology effect

Traditional Arts with New Technologies

The Chinese Opera Centre aims to revitalise traditional Chinese opera through the use of technology.

About

To enhance the relevance and experience of traditional Chinese Opera, the Chinese Opera Centre is developing a system of remote accompaniment using d&b audiotechnik Asia Pacific's (d&b for short) Soundscape Technology. This 360-degree surround effect would allow audiences to feel more immersed in the performance, while tempering the discomfort of high frequencies produced by the traditional musical instruments.

People

1. Chinese Opera Centre
   (Qin Zhan Bao | Artistic Director, Kwan Kam Thim Ian | Project Manager, Lin Jia Rui | Coordinator, Lee Yee Ching | Admin Support)
2. d&b audiotechnik Asia Pacific
   (Kenny Chng | Audio Consultant)

Motivation

As a child, Ian Kwan Kam Thim never missed an opportunity to see a street performance in the 1950s when Peking Opera was part of popular culture and considered a symbol of traditional Chinese art. He was attracted to the grand costumes, headgear, exaggerated make-up and elegant moves. Qin Zhan Bao is a renowned Peking Opera performer, director and choreographer.

Over the years, Peking Opera has become less popular as more diverse modes of entertainment permeated. With dwindling audience numbers, Ian and Qin have a sense of urgency to revitalise the traditional art through the intersection of art, science and technology, and hopefully draw new interest.

Project

The original performance context for Peking Opera was in loud, outdoor environments. Fast forward to the present, and traditional Chinese operas are now performed in soundproof venues that are designed towards Western performing contexts. This has led to an impression of the traditional art form as "noisy".

The team decided to find ways to enhance the auditory experience through technology, instead of changing the original aesthetics of Peking Opera. This sparked the discussion for a "noise" reduction project. From designing adequate sound environments to choosing the right materials and producing new tools, the Lab offered a space to conduct experiments and tests. Apart from developing and testing the remote accompaniment solution, they added on 360-degree surround sound effects using d&b's soundscape system to establish electro-acoustic control over the sound levels and create an immersive audio experience. The team also discovered that they were able to cater for visual and hearing-impaired audiences, making the traditional art form more accessible.

What's Next

Through remote accompaniment, the team hopes to enhance performative elements and cultivate a greater appreciation for Peking Opera, especially amongst younger people. In the long run, they hope the new system can contribute to conserving traditional art forms.

Spang & Lei testing
open-source EEG headset
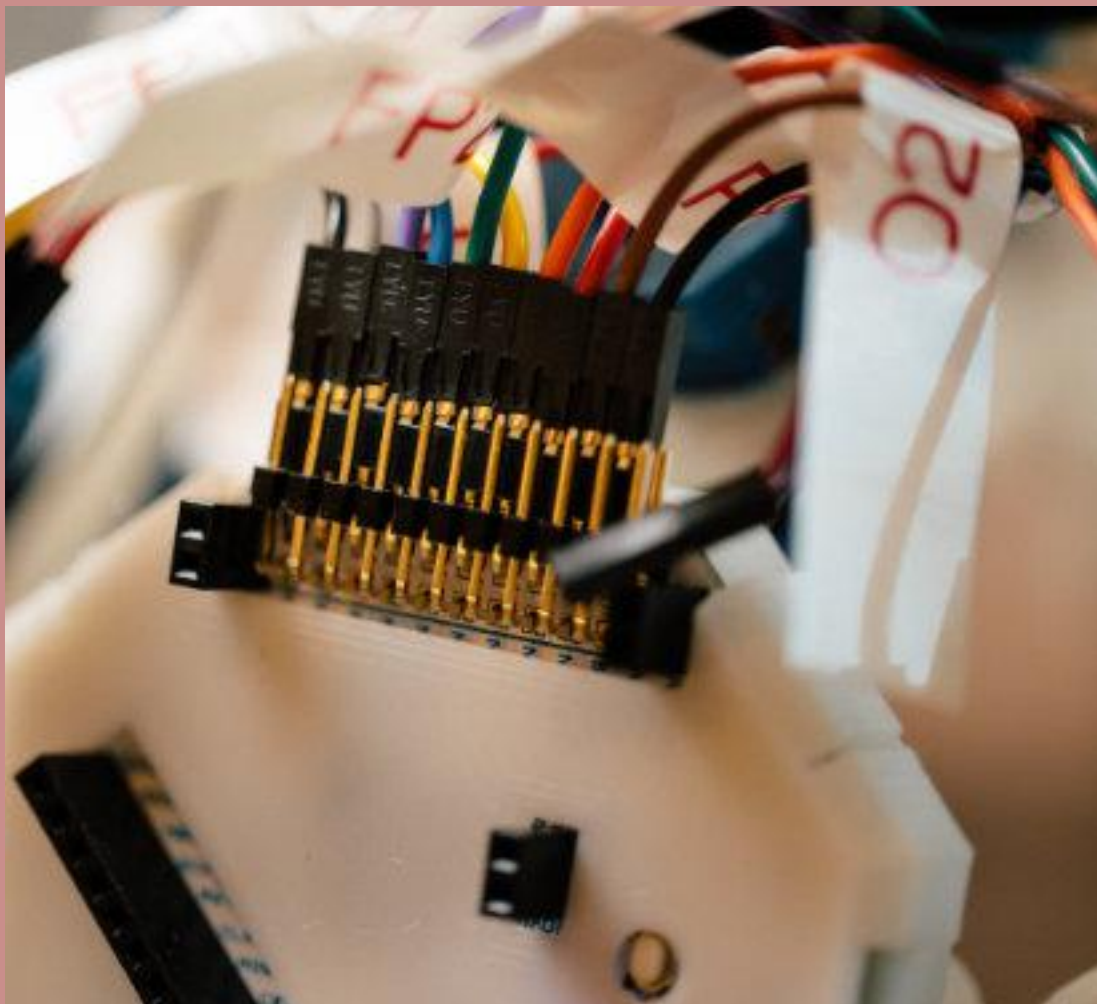
Closeup of electrode
pins on the EEG
hardware board

A Space for Digital Attunement

Can two minds be connected in a moment simultaneously?

About
A Space for Digital Attunement is a durational performative experience that uses biofeedback loops from the brainwaves of live audience-participants (Attunees).

People
Spang & Lei

Motivation
Spang (a performer) and Lei (multimedia designer) began collaborating with one another because they were looking for a new way to perform technology beyond using devices, but through the creation of objects that embody intent, agency and a certain sense of performativity.

Project
Spang & Lei sought to explore what happens when two strangers are connected remotely via electroencephalogram (EEG) headsets, and if one can communicate without words and gestures; using only thoughts.

A Space for Digital Attunement is proposed to be a durational performative experience using biofeedback loops from brainwaves of live audience-participants (Attunees). Two Attunees are seated across each other, connected via the Attunement Apparatus – a programme that captures and transforms live brain signals into transitory light and sound compositions. The current iteration of the project features a single Attunee connected to one EEG headset.

Attunees are guided by a performer-artist (Attuner) through a three-stage experience:

Stage One – Sedimenting: Two Attunees will enter into the Attunement Apparatus by adorning EEG headsets. Light and sound in the environment will be orchestrated based on both Attunees' incipient brainwave signatures.

Stage Two - Swirling: The Attunement Apparatus will initiate contact between Attunees. Both sets of brainwaves will be swirled in the Attunement Apparatus to form a collective light and sound representation of their thoughts. This is the moment when Attunees are encouraged to "start a dialogue" with their counterpart via their thoughts.

Stage Three – Dispersing: Attunees can continue their "mind" conversations for as long as they please until they choose to unhook themselves from the Attunement Apparatus.

What's Next
Spang & Lei are interested in the performative aspect of a theatre show, installation, experience or encounter and hope to take it to a new level through audience interactivity and participation. Instead of the performer being the main person expressing or articulating a piece of work, the audience becomes a part of the process.

T.H.E Dance
Company and
Hiverlab in a
discussion

The team
testing the 360°
camera

Real-Time 360° Virtual Reality (VR) Livestreaming

Exploring the possibility of livestreaming T.H.E Dance Company's dance works in 360°— both visually and auditorily.

About

In collaboration with immersive technology partner Hiverlab, T.H.E Dance Company is experimenting with the possibility of real-time 360° live streaming, viewed in virtual reality, offering an in-theatre experience of an immersive dance performance without having to step out of the house.

People

1. T.H.E Dance Company (Kuik Swee Boon | Artistic Strategist, Athelyna Swee | Project Lead, Brandon Khoo | Production Assistant, Ng Zu You | Production Assistant, Nah Jieying | Production Assistant, Klievert Jon Mendoza | Performer, Fiona Thng | Performer, Haruka Leilani Chan | Performer)

2. Hiverlab (Helmut Chan | Project Coordinator, Dan Lim | Project Manager, Jorlyn Chew | Account Manager, Nicholas Tan | Project Technical Researcher, Oh Rui Xin | Assistant Project Manager)

3. Lighting Coordinator Liu Yong Huay

4. Sound Engineer Joel Manuel Fernandez

Motivation

The acceleration of digital and hybrid performances propelled T.H.E Dance Company to explore high quality, real-time livestreaming alongside live shows that the Company regularly stages. However, they observed that these streams are often lost in a sea of digital content available. Audiences are also compelled to watch these productions from set angles and perspectives that are limited by camera set-ups, without the freedom to gaze at what is not captured on screen. In addition, they may be distracted by their

surroundings, other devices or multiple browser windows.

Yet, the preciousness of live, real-time movement was there. This liveness was something that was missing in the Company's 2020 exploration of a pre-recorded 360° virtual reality experience of *PheNoumenon*—a 2019 immersive work created by Kuik Swee Boon that placed the audience squarely within the performers' space, which originally premiered as a live show at the Esplanade Theatre Studio.

The team setting up the 360° camera for testing

Project

This project was an attempt to combine the two – retaining the live moments of intimate proximity and chance encounters between the performer and the audience, while allowing the audience the freedom to watch a dance performance from angles and perspectives of their choosing.

Best experienced with a virtual reality (VR) headset, 360° real-time livestreaming mimics the experience of physically attending a live performance in a theatre. It brings the theatre into the audience's home, and transports the audience into the theatre, catalysing an up-close-and-personal visual and audio experience of the performance through the VR headset.

What's Next

While the 360° real-time livestream prototype did not meet the Company's expectations in terms of production quality, they gained a better understanding of what could potentially work with the advancement of technology in the near future. They imagine that in time to come, two tiers of tickets could be sold for real-time live streams – regular viewing with predetermined angles, and a 360° immersive experience with the option of renting VR headsets from the Company.

Real-time 360° livestream tests, viewed through mobile phones, laptops and virtual reality headsets

Image by: Helmut Chan

A member of the team
playing his Poikilophone
instrument along with
MASSE

Image by: In Tempo Silico

A member of the
team interacting
with MASSE

In Tempo Silico

Bringing back human-like aspects of music collaboration through Artificial Intelligence-inspired technology tools.

About

In Tempo Silico aims to explore a novel music collaboration paradigm involving live musicians performing advanced electronic instruments with an AI music partner: a human-computer collaboration for the Covid and post-Covid world.

People

1. Lynette Quek, Audiovisual Maker and Improviser
2. Prashanth Thattai Ravikumar, Programmer and Researcher
3. Dirk Stromberg, Improviser and Musical Instrument Builder
4. Pete Kellock, Composer, Inventor and Entrepreneur

Motivation

The world has entered a new paradigm in which increasingly-powerful technologies are enabling increasingly sophisticated collaborations between people and machines. Remote web performances, which became more prominent during the pandemic, was also an impetus in this project.

The research for this AI system was borne of Prashanth Thattai Ravikumar's PhD on MASSE (NUS, 2020), a system for real-time human-machine improvisation of rhythmic Carnatic music. The key idea centred around the possibility of building a system that was more than just a tool for musicians, but one which could listen and respond in ways that feel more like a musical collaborator.

Project

The team focused on creating complementary rhythmic support to human musicians in laboratory settings. As artists, academics, technologists and entrepreneurs, the team hopes that In Tempo Silico can be used and extended across diverse performance scenarios as well as other innovative performance technologies, developing a real-time web-based performance.

In one of the group sessions, the team was looking for sounds that would work well for a rhythm partner and experimented by connecting it to a state-of-the-art sampler, Kontakt. They shared that the results were rich and nothing short of magical to the ear. Artists in the team were able to produce high quality sounds with the system.

https://www.youtube.com/playlist?list=PLUHX5KWf_0DkIZIhPxrUOupEcOd-cTSpo

https://dirkstromberg.org/masse-is-an-algorithmic-rhythmic-partner/

What's Next

The outcomes of the collaboration include performances with both visual and sonic elements involving human improvisers using and collaborating with a range of technologies including In Tempo Silico.

Through experimentation – technical development as well as improvising and writing music together – the aim is to deliver strikingly dramatic and innovative performances. They hope to identify the potential of the system in music and music-technology education, and to explore avenues for future commercialisation.

The members of the Architects of Realities team

The team exploring the virtual space through Virtual Reality headsets

The team in one of their "jam" sessions interacting with projection mapping

Architects of Realities

Is there a way to bring performance to unconventional theatre spaces, be it a physical space or virtual realm?

About

Architects of Realities is an intermedial lab exploring how directors research with actors in live performance, using immersive digital Mixed Reality (MR) and Virtual Reality (VR) technology in multi-layered spaces or realities.

People

1. Nine Years Theatre (Nelson Chia | Artistic Director | Theatre Director & Ensemble Member of Architects of Realities)
2. The Doodle People (Timothi Lim | Creative Director | Artist-Technologist & Ensemble Member of Architects of Realities)
3. Bold Moment Theatre (Khairul Kamsani | Co-Artistic Director | Theatre Director & Ensemble Member of Architects of Realities)
4. Thong Pei Qin, Project Lead, Theatre Director & Ensemble Member of Architects of Realities
5. Cherilyn Woo, Theatre Director & Ensemble

Member of Architects of Realities
6. Joanne Ho, Artist-Technologist & Ensemble Member of Architects of Realities

Motivation

Architects of Realities is an extension of each individual team members' practice into a larger playing field of multiple practice, mediums, contexts, and questions. Within the studio, the goal is not to create but to allow their tools to coexist. As the team's research was experimental, they opted for an exploratory process in which they "jam" with their skills and tools – theatre-making, projection mapping and VR. For them, it was about remaining immersed, curious, excited and hopeful in each step. They would share their personal findings with one another and take notes of the variables that would contribute to the final result. These reflections were compiled into a compendium.

https://issuu.com/vlkvi/docs/jan17_aor_compendium

Project

Architects of Realities experiments with the future of performance spaces by investigating the collision of bodies and technology through the existing

methodologies and practice of actor-training. The experiments involve overlapping multiple virtual spaces on the physical space of the body to question the duality between live (phenomenological) and fictional (semiotic).

By observing the cycle of influence and response between the actor's body and technology in a series of eight practice-as-research sessions, the team hoped to discover elements that culminate in a few alternate methods of immersing both actors and audience into an experience of multiple realities.

What's Next

The team's reflections were compiled into a compendium as documentation of the entire process of navigating and mapping the layers of different realities. They gleaned new insights into how theatre directors could direct in virtual environments and the implications that would have for actor training and directing. For the next phase of their project, the team hopes to conduct workshops facilitated through technology, targeted at theatre students and actors. They have begun pitching to schools.

'Memory Altas'

a methodology by German art historian Aby Warburg that charts the ebb and flows of iconographies through juxtaposing images

'Museum Without Walls'

a concept developed by French writer André Malraux that highlights the spatial constraints in museum acquisition and exhibition

Speculative Fiction

a characteristic style of Argentinian writer Jorge Luis Borges that combines fiction and history into a fabricated, magical-realist experience that alters our consciousness and reality.

The NMS Collection

That is about the Singapore legacy as well as part of the world heritage. This exercise would highlight our position as a hub in East Asia in relation to the global history

Interactive media technology such as AR and Gamification. Exploration of Room Escape, Crowdsourcing, and Quest elements combined with backstory inspired by the NMS collection

A phygital mini-game experience that joins history, fiction, and collective memory

Concept flowchart of the creative process behind the project.

Images by: Justin Loke

A postcard with a drawing of the old St Andrews Church, as viewed from a location near Scandal Point depicted in J.T. Thomson's painting. Image courtesy of The National Museum Collection.

The Memory Atlas is an unfinished project by art historian Aby Warburg. Several boards present a collage of images that share visual iconographies across time and

Recreated 3D model of the old St Andrews Church, with references from postcard drawings and paintings in the National Museum Collection.

History Without Words: The Scandal of the Hidden Painting

A web app that gamifies the museum experience.

About
The project illustrates the gamification of the museum experience, integrating the element of 'play' into the audience's physical engagement. Departing from the linear interpretation of sharing history, this web app offers more visual, interactive viewer-centric narratives by merging new media technology with art history methodologies.

People
Justin Loke, Artist
Jason Koh, Technical Director

Motivation
As a multi-disciplinary artist, Justin Loke enjoys creating works that respond to the subjects of global literature, history and philosophy. Yet the obstacle of language poses a barrier to understanding the nuances of native texts. As such, he hopes to incorporate visual and interactive elements into art history narratives to promote better understanding.

Project
The project gamifies the museum experience, integrating the element of 'play' into the audience's physical engagement with artworks.

Focusing on the historical painting in the National Museum's national collection, *The Esplanade from Scandal Point* by J.T. Thomson as well as its watercolour predecessor, the project expands art analysis by leading the user into a more open-ended method of imaginative thinking. The numerous discrepancies between the two paintings create room for discussion that can be prompted through the creative use of storytelling and user interaction.

https://historywithoutwords.com/

What's Next
In the proposed web app, the target audience will experience text-based storylines, point-and-click clue finding, atmospheric audio, all presented in an aesthetically designed interface. The artist hopes to change the culture of viewing art and exploring a museum through immersive storytelling and technology.

Key Learni

This chapter summarises
the various learnings
gathered from the 10
participating teams.

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Collaborating Across Sectors
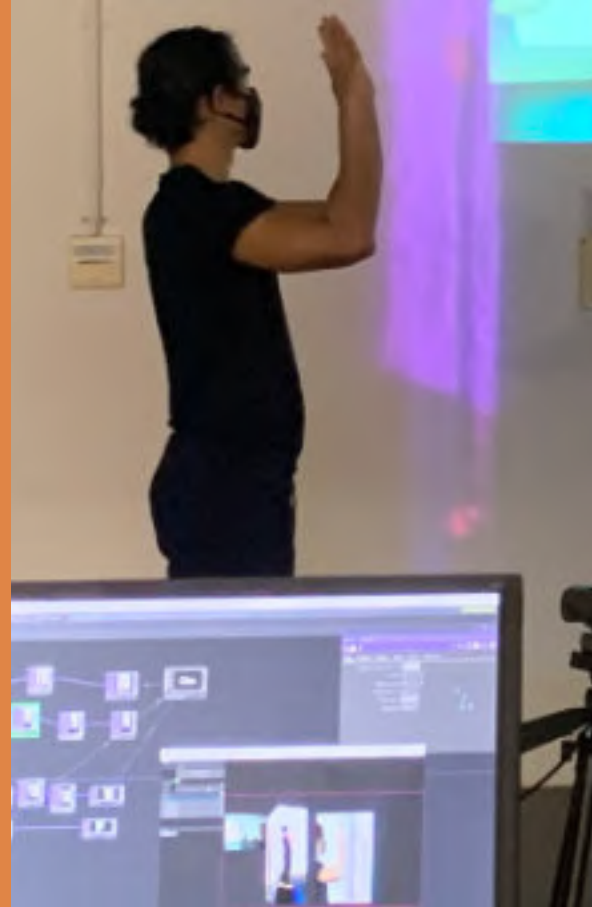
1. Creativity Is Not Exclusive

"The words 'creative' or 'technologist' seem to suggest that being a technologist is less creative than being an artist. I've done lots of both–writing music and writing code—they're equally creative in their own ways. Most of the time, they're so intertwined," adds Pete Kellock (In Tempo Silico). In fact, he believes that having a "hybrid" team member who thinks like an artist and technologist is helpful. "This provides a solid foundation for developing technical solutions and deeper exploration of art-tech ideas," agrees his teammate, Prashanth Thattai Ravikumar.

Similarly, Kuik Swee Boon (Real-Time 360° Virtual Reality Livestreaming) does not see the technologist as somebody who simply executes the work but is a crucial part of the creative process—much like how a choreographer works with a myriad of collaborators such as lighting designers and sound designers to create a production. "With Arts x Tech, you need to see the technologist as part of the collaborating circle and really embrace their work with curiosity to unveil the possibilities and potentialities. Only then would there be surprises and opportunities for growth, and for the work to have a life of its own," says Kuik.

2. Trust your teammates and help them to understand where you are coming from

"If you doubt a person, don't collaborate with them. If you decide to collaborate with them, don't doubt them," says Qin Zhan Bao (The Evolution of Traditional Arts With New Technologies). Apart from listening, this means being open about one's thoughts and ideas. "The key is to work with people who are willing to negotiate and express their needs and goals. I would be explicit about my expectations, and ensure that my feedback is constructive," says Dirk Stromberg (In Tempo Silico).

For Evelyn Ang (The Colonel and the Hantu), there is value in teammates sitting down in discomfort to figure things out together. "Solutions to [the lack of standard workflows] require input from everyone to move forward," she says. Her teammate Christine Chong suggests using visual aids, be it reference images, videos, sketches or diagrams, for more productive discussions between individuals with diverse skillsets.

3. Be open to new perspectives

"Bear in mind that everyone comes from a different field and can see perspectives that we cannot see. The idea is to be able to forget ourselves temporarily and to step into

another person's shoes to experience art (and life) differently. Differences can be very refreshing if we are open to it," quips Guo Ningru (The Colonel and the Hantu). However, don't be afraid to say no as mutually respectful disagreements can lead to a better outcome. "We don't always agree with one another. In fact, we fight a lot about what the best method might be, and I think that is healthy. If someone agrees with everything, you will never grow." says Spang (A Space for Digital Attunement).

To better understand one another's point of view, Bao Songyu (MARCS) brought Justin Ong (MARCS) to a showcase at Gillman Barracks where fellow teammate, Alina Ling (MARCS), was showing her work. "I wanted to see from an engineer's perspective, 'what does he perceive as what is good or not good [art]?" says Bao. For Justin, it was an eye-opening experience. "I usually think of art as paintings or sculptures but with Alina's work, it was about presenting an experience. I started thinking, 'what does art actually cover'? I went out still not knowing what art is, but my experience and definition of art has expanded," says Justin.

4. Create a fun atmosphere to motivate team members

Creating something new as a team should be an enjoyable process. This sets the tone for a positive atmosphere even when things get stressful. "I think the idea is to maintain the spirit of having fun, be open to learning, and have a positive energy which will help give extra meaning and strength in the journey," says Kuik.

Timothi Lim (Architects of Realities) agrees, "whenever we do our lab sessions together, it's really fun. We're not sure how we're going to get to the final destination, but we know where to start. We know how to end. Everything in the middle, we're figuring it out as we go," he says

Tips for the Working Process

1.Communicate expectations and scope of work

When it comes to working with different people, it is ideal to clarify everyone's expectations to prevent potential misunderstandings down the road. "The most important thing is to decide on the scope of what everyone is doing. When people have different expectations, conflicts arise. If everyone has the same expectations of what's going to happen, and who should be doing what, it becomes quite clear, " says Chan Li Ping (speak your mind).

Dirk Stromberg (In Tempo Silico) adds that things can spiral out of control quickly if teammates are not open about their doubts or elusive in their process. Setting up adequate communication channels can help align expectations and ensure that everyone is on the same track.

2. Create milestones and strive towards a common goal

For Christian Teo (Folko), it was fruitful to break the creative process into smaller parts so that a big project seems less daunting. "Put your effort into breaking a big idea down into manageable and workable parts," he says.

> "It doesn't really matter what project you're doing or on what platform you're using, the most important thing is that everyone is working towards the same goal and trying to achieve good things together," says Helmut Chan (Real-Time 360° Virtual Reality Livestreaming).

3. Step into the end users' shoes but don't blindly oblige to their whims

When it comes to creating for people, it is necessary to step into their shoes to look for clues as to how they may react or experience your work. "There is always the possibility that we're working too much in silo, or within your own internal team that you end up thinking that what you're doing is usable but actually, it isn't," says Chan Li Ping (speak your mind).

However, one cannot depend purely on the end users' input. "Whenever it comes to testing, we ask users what they want, but they can never ever tell us exactly. That's normal, and I think part of our job is to analyse their words and find out what their needs are. It's up to us to translate whatever they're saying into requirements to take things to the next level," says Melody Koh (Folko).

4. Expect the unexpected and let go of control

"The user may not use your product the way that you envisioned them to do so. That's okay. It doesn't necessarily mean you're a bad designer. Humans are flexible and we think in so many different ways," says Ng Fong Yee (speak your mind). Spang (A Space for Digital Attunement) adds, "when the audience fiddles with your artwork, a lot of things can go wrong. The idea is to embrace what you can't control. The artwork is never complete until the audience or the viewer is engaging with it."

> For Alina Ling (MARCS), unpredictability makes the process more enjoyable. "I don't particularly like it when the process is too flat and straightforward. I think having ups and downs make it interesting," she says.

5. Turn limitations into strength and record the "failures" to do better next time

"When it comes to a project involving technology, you have to come to a point where you need to compromise because you cannot fight the technology, there's so much that the technology can do or cannot do," says Lei (A Space for Digital Attunement). However, limitations can become something creative. "My goals for this project are quite clear. The idea is to build it based on what is possible. Turn weaknesses into strengths, or utilise the weaknesses and make them into something creative or special," says Kuik Swee Boon (Real-Time 360° Virtual Reality Livestreaming).

The Lab has also taught Nicholas Tan (Real-Time 360° Virtual Reality Livestreaming) that dead ends can help pre-empt future failures. "Dead-ends matter. Write it down and figure out why something failed. These documentation efforts help you do better in future," he says.

The Bigger Picture

1. Build a community of like-minded individuals

Like-minded people motivate each other. "We search for communities that can help us and that's what I think is the true foundation of the Arts x Tech lab. Learning, for me, is forming a community and connecting with people," says Timothi Lim *(Architects of Realities)*.

Meeting people and sharing ideas can lead to the right questions asked. "I think what was really good about the Arts x Tech Lab is the constant articulation of your process and your concept to different stakeholders. That is something that as artists, we don't often get an opportunity to do because we will be in our studio, hacking away or testing. The Arts x Tech Lab has facilitated necessary conversations that make us question our own processes," says Lei (*A Space for Digital Attunement*).

2. Arts x Tech for a better world

Prashanth Thattai Ravikumar (*In Tempo Silico*) encourages one to stay curious, observant and passionate, adding "the use of AI for art is an evolving area. Amongst other things, it involves studying people's perceptions of their interaction with systems that exhibit intelligent, and non-intuitive behaviour. There are many interesting questions in this domain and a lot of worthwhile experimentation to be done, which makes it exciting."

> For Justin Loke (*History Without Words: The Scandal of the Hidden Painting*), technology can help visual artists like himself find new ways to impact the greater community. "Rather than letting technology dominate us, I hope we can find a new understanding of how it can be used to change the way we tell stories and serve our culture," he says.

Rather than satisfy temporary trends or whims, meaningful products will go a long way. "It is imperative for those who work in new media technologies to work with cultural workers to investigate and create meaning. The competitive drive produced as a result of the capitalistic progression of our society has pushed us to feed the demands of consumers. It's important to take a step back and look at the bigger picture," Joanne Ho *(Architects of Realities)* concludes.

Epilogue

Epilogue

Development in arts and technology is an ongoing process of learning, adapting and exploring. Technology serves as a medium that can empower the diverse field of art creation through new modes of presentation and delivery while improving accessibility amongst the audience. Similarly, art pushes the boundaries for the application of technological tools, offering a new lens on how technology—even those originally developed for non-artistic purposes—can be applied to the arts.

Despite the conclusion of the first edition of the Lab, NAC will continue to follow the developments of the 10 prototypes over the next six months to a year, and actively connect them with potential adopters, commissioners, festivals, presenting venues and cultural institutions. Where the prototypes are of interest and potential application to those outside the arts and culture sector, it hopes to leverage on its relationships with adjacent sectors such as media, design and technology to encourage more cross-pollination of ideas and explorations to take place.

"The inaugural edition of the Lab has met NAC's expected outcomes, and we intend to continue supporting such labs for the sector in the future. We hope that the Lab inspires more innovation and experimentation between both the arts and technology sectors, and encourages the artists to continue to innovate and transform their practice with technology," says Melanie Huang, Director (Industry and Business Transformation). The Lab is only the beginning of greater artistic outputs borne of the collaboration between the two domains.
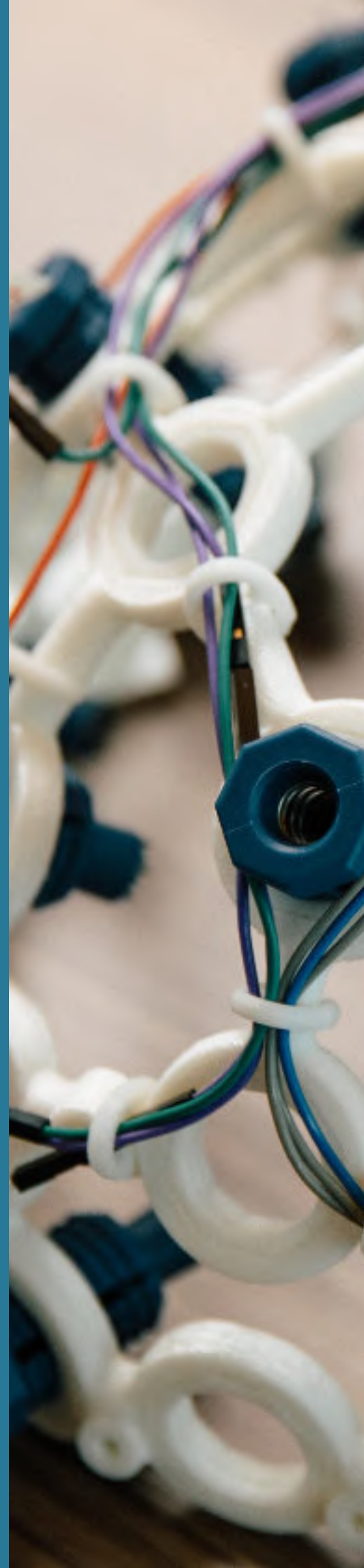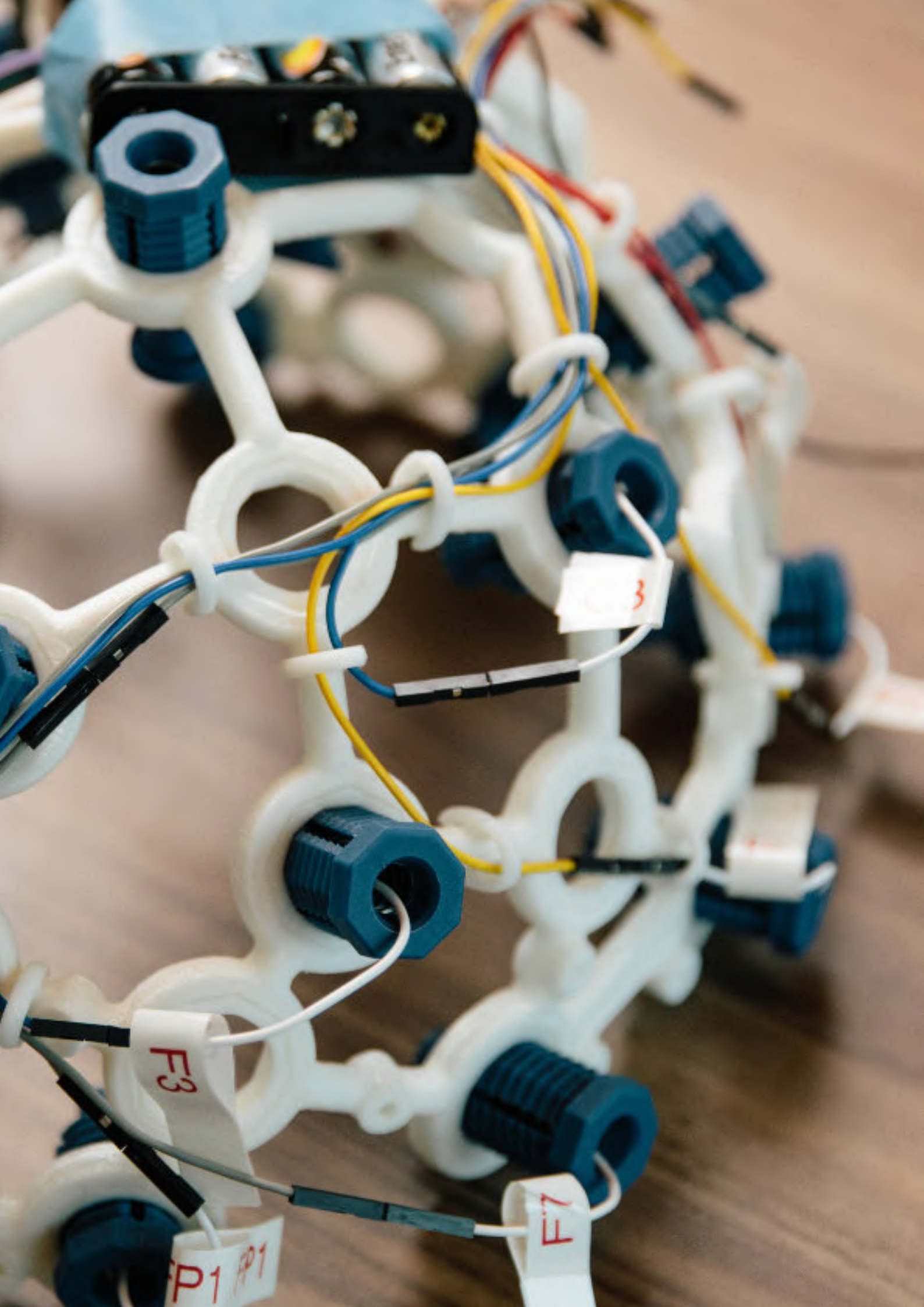
Index

A. About the inaugural Arts x Tech Lab

The Arts x Tech Lab is the National Arts Council (NAC)'s inaugural innovation lab that fosters collaboration between the arts and technology sectors. The Lab is designed to empower creatives, artists and technologists to engage in innovative experiments and collaborations. It also aims to build capabilities, co-drive innovation and support changemakers from within the arts and technology sectors.

Open Track	Reimagining artistic practice and new ways to reach audiences	Connecting people from different communities	Art/ performance space of the future
National Museum Track	Blending arts and heritage experiences	Working with technology to offer new perspectives to the National Collection	Working with technology to enhance museum-based learning

The Lab focuses on supporting arts-technology ideas that respond to one of the following themes, across two tracks. Through an Open Call conducted in early 2021, 10 participants were selected to take part in the eight-month Lab, across two phases, each of which was customised to the readiness of the participants and their project ideas. In order to support the development of a prototype or work-in-progress experience, the Lab offered a range of support and resources including workshops by experts, networking opportunities, mentorship and consultancy, peer learning opportunities, feedback from an expert panel and funding support.

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