

PERFORMING ARTS X TECH

LAB

FROM 05.04
2024

TO 13.04
2024

INDUSTRY SHARING

VENUE ESPLANADE
ANNEXE STUDIO

ABOUT

The Performing Arts x Tech Lab is organised by National Arts Council (NAC) in partnership with Esplanade - Theatres on the Bay, and Keio-NUS CUTE Center as technology consultant. This edition of the Lab started in August 2023, supporting practitioners who work in the performing arts or with performance in general, encouraging innovation and experimentation by seeding collaboration between arts and technology.

The Performing Arts x Tech Lab Industry Sharing is the culmination of research and prototyping by six project teams over nine months. These teams leverage technologies including Artificial Intelligence (AI), neural audio synthesis, motion sensors, wearable devices, and interactive projection technologies to transform their artistic creation and practice. Whether through experimenting with new tools and methodologies for performance-making or presenting alternative modes of expression, these ideas offer a glimpse into a future of new experiences and possibilities in performing arts.

Without imposing predefined outcomes for the projects, the Lab supported participants with seed funding, workshops, and consultation sessions with an international advisory panel. Prototypes, demonstrations, and documentation, including participants' reflections, trial-and-error processes, and achievements, are showcased. It is hoped that the Industry Sharing can offer the participants a launchpad to further develop their projects and ultimately see them adopted.

For more information about the
Performing Arts x Tech Lab, please visit
the NAC website at: go.gov.sg/artsxtechlab

EXHIBITION

5, 6 AND 13 APRIL

12 - 10PM

11 AND 12 APRIL

12 - 8PM

THERE WILL BE A 30-MINUTE GUIDED TOUR OF THE EXHIBITION AFTER EACH PROGRAMME.

PROGRAMMES

FRI
APR

05.

2PM - 3PM

THE SOUND OF STORIES

Sharing Session & Demo

Experience a live demo of how a storyteller, sound artist, and AI engineer have used neural audio synthesis and AI to reimagine live storytelling for a more dynamic, engaged audience experience.

Featuring Kamini Ramachandran, Syafiq Halid, and Chen Enjiao (Ernie)

8PM - 9PM

VERGE 2.0

Panel Discussion & Live Demo

What are the possibilities for the creative interplay between technology and human gestures? The *Verge 2.0* team and their collaborators come together to discuss and present live demonstrations of their work, which integrates interactive technology with movement-based performing arts.

Featuring James Lye, Dr Noramin Farid, Norisham Osman, Eugene Soh, Cassie Shi, Dalifah Shahril, Ian Pereira, and Dr Nidya Shanthini Manokara



SAT
APR

06.

11AM — 12PM

DOTS 2.0

Live play-test (for children)

Suitable for children aged 4-9 years old. Experience a performance inspired by award-winning children's book, *The Dot* by Peter H. Reynolds, and join us onstage to paint on a wall - with a little help from technology!

Featuring Isabella Chiam, Cherilyn Woo, Chew Shaw En, and Timothy Ellim

8PM - 8.40PM

DANCING THE ALGORITHM (DatA)

Performance-lecture

How do we dance collectively?

This performance-lecture reflects on the space between dancing bodies and computational logic, and the potential of collaborating with the machine for artistic expression.

Featuring Dapheny Chen and SERIAL CO_



SAT
APR

13.

1PM - 2.30PM

PERFOR.ML

Performance-presentation

With *perfor.ml*, Feelers investigates the possibility of bringing machine learning into performance – on whose terms, and for what goals? They will present an excerpt from their performance, and speak about their research journey.

Featuring Alysha Chandra, ants chua, and Ashley Hi

8PM - 8.40PM

THEORIES OF MOTION

Performance-lecture

How do we understand and express movement? In this performance-lecture, interactive designer Alina Ling, movement artist Zhuo Zihao, and sound designer rongzhao share how they merged their perspectives on motion and explored the relationship between human expression and technology over the course of the Lab.

Featuring Alina Ling, rongzhao, and Zhuo Zihao

DANCING THE ALGORITHM

(DatA)



Dance artist Dapheny Chen during a movement research session with SERIAL CO_

SYNOPSIS

DatA embodies the concept of expressing the algorithmic process through movement and choreography. The goal is to enable the system to learn, generate, and regenerate movement scores through the logical and computational aspects of an AI algorithm. As time progresses, it evolves into a living digital dance archive that expands organically, transforming into an interactive platform for dancers to explore, interpret, and manifest computer-generated sequences with their unique style and flair.

The inception of *Dancing the Algorithm (DatA)* was sparked by a fundamental inquiry: ‘How do we dance collectively?’ Through an ongoing duet between computational fragments and individually coded movement sequences, this project delves deep into the intersection of computational logic and human expression, expanding upon dance-making and performance tools.

Throughout the Lab’s duration, the team conducted movement research workshops to facilitate data collection with a focused exploration of possibilities rather than fixating on a final product. Utilising motion capture technology, they developed a prototype of the system in action, considering its potential usage in collective dance dynamics and the feasibility of collaborating with the machine for artistic expression.

DatA merges the seemingly contradictory realms of dance expression and computation, forging a symbiotic relationship. The algorithm comes alive through the expressive capabilities of the human body. More importantly, it has the potential to expand its reach beyond dancers and the dance medium, providing a tool for individuals to tap into their distinct ‘movement DNA’ and unleash personal expressions.

DANCE ARTIST

Dapheny Chen

CREATIVE TECHNOLOGIST STUDIO

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DOTS 2.0



Children playing with the interactive projection during a workshop with the DOTS 2.0 team

SYNOPSIS

Recognising that technology is a part of children's everyday lives, this project seeks to find new ways in which young audiences can engage with theatre. Combining the arts (physical movement and visual art) and technology (motion capture and multi-media projection), *DOTS 2.0* encourages children to express themselves freely through storytelling, play and technology, creating a contemporary theatre experience.

Conceived for young audiences, *DOTS 2.0* is a theatrical adaptation of the award-winning children's book *The Dot* by Peter H. Reynolds. Covering themes of creative empowerment and resilience, the story follows the artistic journey of a young girl who believed that she could not draw—until her art teacher advised her to “just make a mark and see where it takes you.” (Reynolds, 2003).

DOTS 2.0 is a non-verbal, visual- and movement-based performance with an interactive component. Motion sensors are set up to track the movements of the performer and the audience. As the narrative progresses, the performer's movements form paint strokes that are projected on the walls. The same sensors also pick up on the audience's movements, inviting them to “make a mark” and express their creativity using their entire bodies. By enabling children to partake in the art-making, the team hopes that *DOTS 2.0* can help build creative confidence in them.

As an extension of *DOTS 2.0*, an AR app is being considered to extend the after-show experience. With the app, children can bring a part of the interactive experience home, allowing them to further engage with the story's themes and bond with their parents.

Reynolds, P. H. (2013). The Dot. Candlewick Press.

PROJECT TEAM

[Issy x Cher](#)

Five Stones Theatre

Timothi Ellim

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PERFOR.ML



Performers Alysha Chandra and ants chua from Feelers during a work-in-progress presentation of their movement piece

SYNOPSIS

perfor.ml, where ‘ml’ refers to machine learning, is an ongoing research project that puts forth a new performance methodology. It investigates the possibility of bringing machine learning into performance, asking ‘on whose terms, and for what goals?’

The work-in-progress iteration of *perfor.ml* is manifested as a movement piece that comprises human actors and kinetic sculptures. Accompanied by a collage of found and fictional text, the movement piece presents the audience with a speculative glimpse into the world of data centres. Kinetic sculptures on stage are both responses to and representations of the compression of vast quantities of data.

Early proposals examined what a collaborative dynamic between machines and human performers could look like in performance. The team explored how machine and human actors might use movement to communicate, and how this dialogue of spatial and kinetic data could impact decision-making on stage.

The research led the team beyond the process of generative output to the physical infrastructures that enable this technology. The team delved into the vast network of data centres where much of the storage and processing for machine learning takes place, alongside the people working in the shadows to keep them running.

Throughout the Lab, the team strove to consider the machine as a collaborator with its own peculiar features and personality. Rather than approaching machine learning as an inert tool, or subjecting it to the logic of human cognition and culture, *perfor.ml* is an attempt to go beyond hype, hysteria, and spectacle to arrive at vital questions about sustainability and the artistic potential of technology.

FEELERS IS A RESEARCH LAB OF ARTISTS AND DESIGNERS
FOCUSED ON THE INTERSECTIONS OF ART AND TECHNOLOGY.

PROJECT TEAM

Ang Kia Yee
Ashley Hi
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ants chua

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THEORIES OF MOTION



Interactive designer and technologist Alina Ling working on synthesising the kinetic data from the movement artist, Zhuo Zihao

SYNOPSIS

Considering the body as a central instrument, *Theories of Motion* seeks to integrate projection, sound, and moving bodies, where refined physicality merges with digital and sonic realities. However, rather than focusing on the development of new technology for performance, the primary objective was to explore how technology could seamlessly translate into or extend expressions in movement, or vice versa.

The inception of the project can be traced back to the collaboration between multidisciplinary practitioners attempting to understand motion within performing arts. This collaborative effort involves a movement artist, an interactive designer and technologist, a sound designer, and a performance and technical director, utilising technology as a mediator to reconcile varying viewpoints.

Workshops commenced with the deconstruction of a performer's movements into fundamental principles, facilitated by an interactive sensor system designed to extract quantitative data from qualitative movements. The project experimented with the analysis and filtering of the movement data from embodied sensors, attempting to identify the nuances across the different dimensions of movement. These sessions involved extensive discussions on the essence of movement and its potential categorisation or structure for further exploration. After the workshops, the movements and data were translated into sonic and visual outputs that were further synthesised, refined and controlled.

Ultimately, the goal is to unite the performer, the system and the environment to transcend physical and virtual expressions of the body. *Theories of Motion* stipulates that there are new possibilities for amplifying expression, where the subtleties of the performer's movement can influence the derived environment—body, projection and sound. The project seeks to explore the sensations that are evoked through finding harmony between the various means of movement.

PERFORMANCE AND TECHNICAL DIRECTOR

Andy Lim

INTERACTIVE DESIGNER AND TECHNOLOGIST

Alina Ling

MOVEMENT ARTIST

Zhuo Zihao

SOUND DESIGNER

Yong Rongzhao

TECHNICAL CONSULTANT

Justin Ong

WEBSITE

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THE SOUND OF STORIES



Storyteller Kamini Ramachandran, AI engineer Ernie Chen, and sound artist and sound designer Syafiq Halid testing their prototype AI storyteller

SYNOPSIS

Utilising deep learning and neural audio synthesis as creative tools, *The Sound of Stories* explores ways for storytelling to be delivered in numerous languages whilst maintaining the original voice and cadence of the human storyteller, offering possibilities for engaging multiple, diverse audiences in the same room, or for the storyteller's unique delivery to be experienced even when they are not physically present.

One of the oldest modes of human expression, oral storytelling is an engaging art form that exists across cultures, conveying narratives, histories, folklore, and tales across generations. Yet, its delivery is confined to the physical presence of the storyteller, often excluding audiences who share a different language. In *The Sound of Stories*, technology is perceived as an artistic ally, enhancing and safeguarding traditional oral storytelling practices to ensure its endurance in an ever-evolving world.

As part of the Lab, the team trained the AI to listen to hours of stories told by Kamini Ramachandran, a veteran oral storyteller. Beyond mere translation, the machine can also emulate Kamini's voice, cadence and expression for the story as it is experienced in another language. The team further explores audience interactivity through the use of a prototype AI Storyteller, which poses questions to the audience and weaves their answers into the story; and a prototype sound controller system that utilises neural audio synthesis to shape the soundscape that accompanies the storytelling.

The Sound of Stories offers a glimpse into the future of storytelling practices, through combining the ingenuity of AI with the artistry of oral storytelling. Through the blend of human input and AI, audiences can become an active part of the narrative experience, whilst the storytellers can reach a broader audience, passing on their stories and delivery techniques to future generations.

PRODUCER AND LEAD ARTIST

[Kamini Ramachandran](#)

SOUND ARTIST AND SOUND DESIGNER

[Syafiq Halid](#)

AI ENGINEER

[Chen Enjiao \(Ernie\)](#)

VERGE 2.0



Film still from *Verge 2.0*'s performance-lecture, featuring movement performers Dr Noramin Farid, and Cassie Shi

SYNOPSIS

The latest iteration, *Verge 2.0*—developed as part of the Lab—integrates interactive technology with movement-based performing arts. Dancers, adorned with wearable tech on their arms, can control and manipulate sound, light and visuals through movement. This gesture-responsive technology creates a dynamic multi-sensory environment that synergises with the choreography, enriching the performance.

Originating as a university tech project, *Verge* has evolved over the last decade through collaborations with multidisciplinary art practitioners. A continuous exploration of dance and technology, *Verge* has been presented in multiple forms, from interactive installations to multi-disciplinary performances and research initiatives.

Accelerometers and flex sensors are strategically attached to the joints—where movement is most pronounced—on the upper limbs of traditional dancers. These components are then integrated with an Arduino microcontroller, enabling the wireless transmission of real-time movement data to a central computer. Subsequently, a visual-based programming software translates this data into actionable commands, allowing for control over various stage elements such as brightness and colours of light, volume, pitch and timbre of sound.

Despite the various iterations over the years, *Verge* has been consistently grounded by its core objective: to explore the creative interplay between technology and human gestures. Apart from facilitating the fusion of movement and multimedia elements, *Verge 2.0* is relevant to dancers of diverse cultural backgrounds and genres. It enhances the creative process for performers and delivers an immersive experience for the audience. With the potential to add more sensors, stage controls or dancers, new performance possibilities are waiting to be unlocked with future renditions.

PROJECT LEAD AND CHIEF TECHNOLOGIST

James Lye

DANCE RESEARCHER AND DANCER

Dr Noramin Farid

CREATIVE PRODUCER AND PROJECT MANAGER

Norisham Osman

CREATIVE TECHNOLOGIST

Eugene Soh

COLLABORATORS

Cassie Shi (Dancer),

Dalifah Shahril (Material Consultant),

Ian Pereira (Lighting Consultant) and

Nessa Anwar (Script Consultant)

WEBSITE

www.jameslyemusic.com/verge

ACKNOWLEDGEMENTS

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ADVISORY PANEL

Toby Coffey Head of Immersive Storytelling Studio, National Theatre (UK) | Danny Yung, Founding Member and Co-Artistic Director, Zuni Icosahedron (HK) | Clarence Ng, Production Project Manager, Yamaguchi Center for Arts and Media (JP) | Akiko Takeshita, Producer of Performing Arts, Yamaguchi Center for Arts and Media (JP) | Mitsuru Tokisato, Artist and Video Engineer, Yamaguchi Center for Arts and Media (JP) | Ho Tzu Nyen, Artist (SG)

TECHNOLOGY CONSULTANT

Dr Yen Ching Chiuan (Director of Keio-NUS CUTE Center)
Teo Chor Guan (Senior Research Fellow) | Dr Clement Zheng
(Asst. Professor NUS Division of Industrial Design)
Hilal Fitri Bin Rohaidi (Software Engineer)

PROJECT MANAGEMENT TEAM

Deanna Dzulkifli, Producer | Mok Cui Yin, Producer
Natasha Lau, Project Assistant | Pearlyn Tay,
Event Assistant

INDUSTRY SHARING GRAPHIC DESIGN

Fellow Design

INDUSTRY SHARING PRODUCTION

Se7en Friday | Terence Lau, Technical Manager

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Performing Arts x Tech Lab Industry
Sharing with us.

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