

INSTITUTE FOR
CREATIVITY,
ARTS, AND
TECHNOLOGY

ICAT

Beyond boundaries, into possibility.



FROM INTERIM CO-EXECUTIVE DIRECTORS LISA MCNAIR & TOM MARTIN

2025 BROUGHT MANY CHANGES TO ICAT. Most notably, Ben Knapp retired from Virginia Tech to become Dean of the College of Arts, Media, and Design at Northeastern University. Ben's new position is a well-deserved recognition of his success in making ICAT into a world leader in transdisciplinary research and scholarship at the intersection of art, design, engineering, and science. Since 2011, Ben has made collaborative connections across and beyond Virginia Tech, building teams that span department, college, and international boundaries, enabling them to go further than they ever would have on their own. The ICAT team is happy for Ben and wish him well, but we're sad to see him go. We're also confident that we'll be able to stand on the firm foundations that Ben built to make ICAT have a greater impact.

Another change is that the two of us, Lisa and Tom, have been serving as the interim co-executive directors of ICAT. We have worked together for nearly 20 years on interdisciplinary research and education, and have taken turns as the deputy directors of ICAT over the last decade. We're humbled and honored to be entrusted with leading ICAT in these changing times. Our goal has been to provide continuity for the ICAT community while the university searches for a new executive director, and to make strategic adjustments that will strengthen ICAT for the future. And as this magazine went to press, Tom was named executive director, starting on May 10, 2026.

With ICAT in its 15th year, we continue to build networks that connect Virginia Tech with arts organizations nationwide and abroad. We're thrilled about the accomplishments of faculty and students supported through ICAT projects and SEAD grants. ICAT houses three research centers – the Center for Human Computer Interaction (happy 30th year, CHCI!), the Center for Educational Networks and Impacts, and the Center for Future Work Places and Practices – as well as the university's newest Destination Area, the Smart Healthcare Hub.

Our National Endowment for the Arts (NEA) Research Lab on innovation and the arts has just received funding for a second phase. ICAT-seeded work is reaching partners across the U.S. and in Egypt, Canada, Ireland, and Italy. Together with the Alliance for the Arts in Research Universities (a2ru), we are addressing current topics with policymakers and industry leaders, such as AI and the Arts. Our NEA Research Lab has Leonardo and Northeastern University as partners – yes, we're still working with Ben (and we promise not to tell his new Boston colleagues that he's a Yankees fan...).

Finally, the ICAT administrative team has moved to the Media Building, bringing more of us together in one space. If you're in Blacksburg, please stop by and say hello. ■

Lisa & Tom



Virginia Tech photo

Rodney Kimbangu

TOM MARTIN AND LISA MCNAIR are the interim co-executive directors of the Institute for Creativity, Arts, and Technology (ICAT). Tom is a professor in the Bradley Department of Electrical and Computer Engineering, and Lisa is a professor in Engineering Education.

ABOUT ICAT

Mission

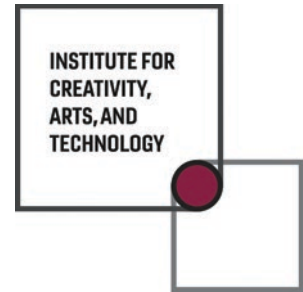
The Virginia Tech Institute for Creativity, Arts, and Technology (ICAT) empowers teams with state-of-the-art facilities, expert knowledge, and seed funding to tackle grand challenges and explore creative possibilities. From addressing societal issues to advancing organizational projects and pushing the limits of artistic expression, we're at the forefront of innovation.

Vision

ICAT aspires to be a dynamic fellowship of artists, designers, engineers, humanists, and scientists, united in a living laboratory that champions human-centered creativity. Through inclusion, co-creation, innovation, critical reflection, and iteration, we exemplify the creative process. Our growth and impact thrive on partnerships with organizations both regionally and globally.

Structure

ICAT is one of the four investment institutes at Virginia Tech. We support faculty and students across all colleges, and are synergistically partnered with the Center for the Arts to create a combined initiative that is unique in its scope and impact.



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ICAT

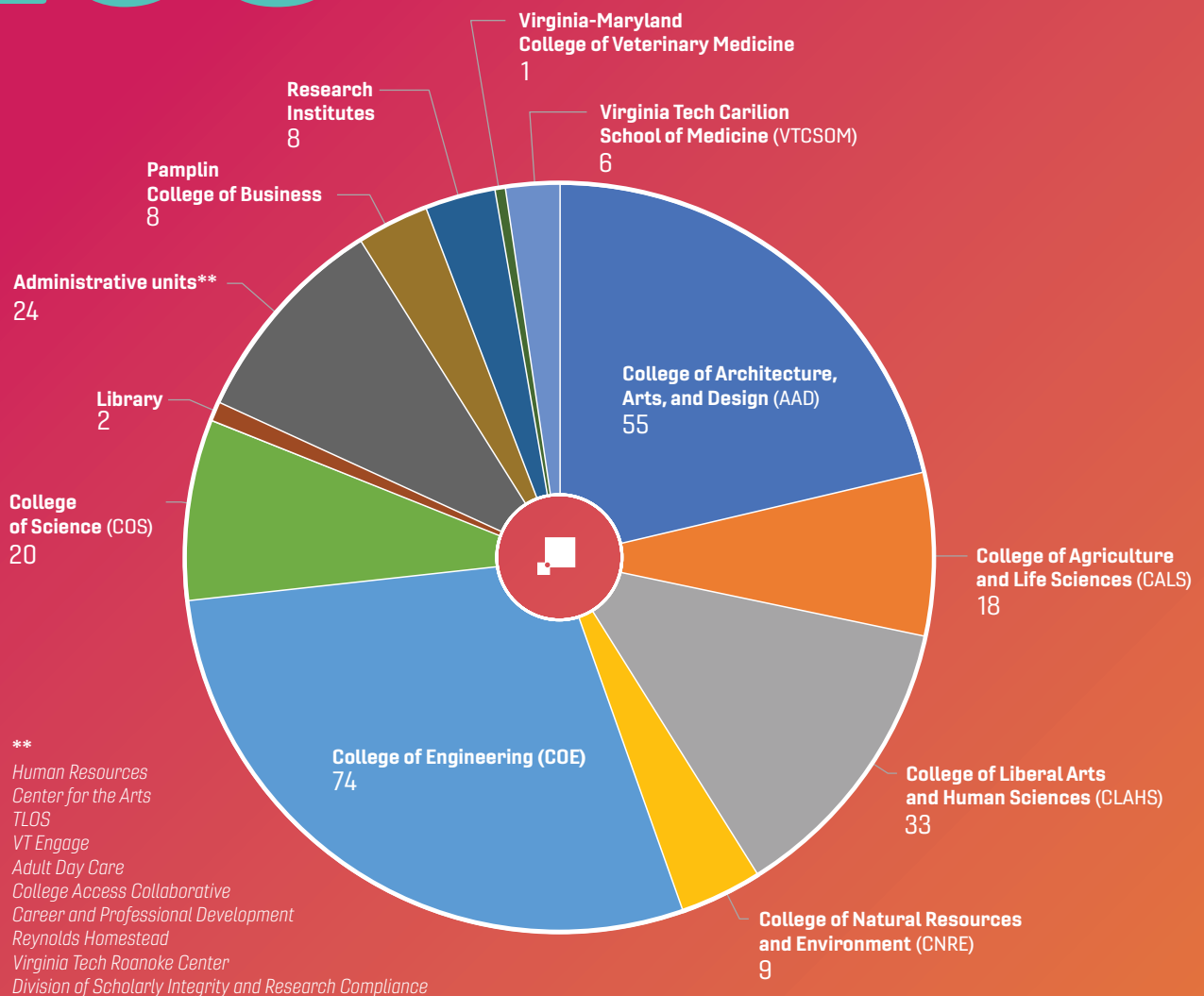
IMPACTS

FY 20-21 through FY 24-25

258

FACULTY SUPPORTED

from 37 DEPTS across 8 COLLEGES



Grants can be used for transdisciplinary activities, including creative projects, feasibility studies, and preliminary research. We hope that projects will grow into larger initiatives, performances, exhibitions, or events that are visible at a national or international level.

SEAD Grants

\$1,084,270

IN TOTAL FUNDING GIVEN

39 MAJOR **32** MINI **31** STUDENT

CENTER FOR HUMAN-COMPUTER INTERACTION

CHCI continues to be ranked in the **top 15** in the US and in the **top 25** in the world for Virtual Reality and visualization research, and in the **top 30** nationally in other HCI-related areas. (according to csrankings.org)

Doug Bowman, former director of CHCI, is the **3rd most highly cited researcher** in the history of the field of 3D user interfaces (according to Google Scholar).

CENTER FOR EDUCATIONAL NETWORKS AND IMPACTS

81

Publications by CENI affiliates related to CENI's mission and research priorities

4,309

Hokie for a day participants

11,639

Virginia Tech Science Festival attendees

\$197,210

Research expenditures for the 2025 fiscal year

CENTER FOR FUTURE WORK PLACES AND PRACTICES

Formed in 2022

as ICAT's third research center.

There are currently **73** faculty affiliates and **18** student affiliates across the university.

ICAT CONNECTS:

Art, Technology, and the Future of Virginia Tech in Alexandria

THE OPENING OF ACADEMIC BUILDING ONE in Alexandria has expanded Virginia Tech's physical footprint and deepened its commitment to creativity, technology, and cross-campus connection in Northern Virginia.

At the heart of this effort is the Institute for Creativity, Arts, and Technology, which is helping to shape the university's presence both inside and outside the building.

"Carving Out Creativity," one of the first public installations in the new space supported by the institute, brought together participants from multiple cities through a multisensory experience. The installation enabled users to connect in real time through touch, sound, and visualizations of brain activity. The project embodied the building's purpose: to serve as a hub linking Virginia Tech campuses and communities through creative research and engagement.

Outside the entrance, "Emergence," an 8-foot steel sculpture designed and fabricated by a team of students and supported by the institute, stands as a bold expression of interdisciplinary collaboration. Drawing inspiration from nature, the sculpture began as a Master of Fine Arts thesis project. It now anchors a prominent public plaza near the building, inviting passersby to explore the intersection of art, science, and design.

Together, these projects demonstrate how the Institute for Creativity, Arts, and Technology's work advances Virginia Tech's mission. As the institute expands its reach, Alexandria has emerged as a key location for uniting creativity and technology in service of human connection.

Luke Hayes



ACADEMIC BUILDING ONE
in Alexandria, Va.



VISITORS interact with the “Carving Out Creativity” installation in the Immersive Visualization Lab during the opening celebrations at Academic Building One.

EXPERIENCE ART across space and time

By Travis Williams*
Photos by David Fransulich

FEBRUARY 2025, A NEW VIRGINIA TECH ART INSTALLATION invited participants into a shared, multisensory experience – connecting people across distance through touch, sound, vision, and creativity.

“Carving out Creativity” brought together artists, engineers, neuroscientists, and designers to explore how art-making fostered human connection, even when participants were separated by geography. The installation used both ancient artistic practice and advanced technology to allow visitors at different locations across Virginia to experience art simultaneously.

“This was a very complex project, but it really boiled down to bringing people together,” said Lisa McNair, interim co-executive director of Virginia Tech’s Institute for Creativity, Arts, and Technology (ICAT). “It was human connection forged from arts-based scholarship and

technology-based research.”

The project debuted as Virginia Tech celebrated increased connectivity across the Commonwealth of Virginia with the opening of Academic Building One in Alexandria. One of four installations was housed in the new building, alongside displays at the Cube in the Center for the Arts in Blacksburg, the Taubman Museum of Art in Roanoke, and the Torpedo Factory Art Center in Alexandria.

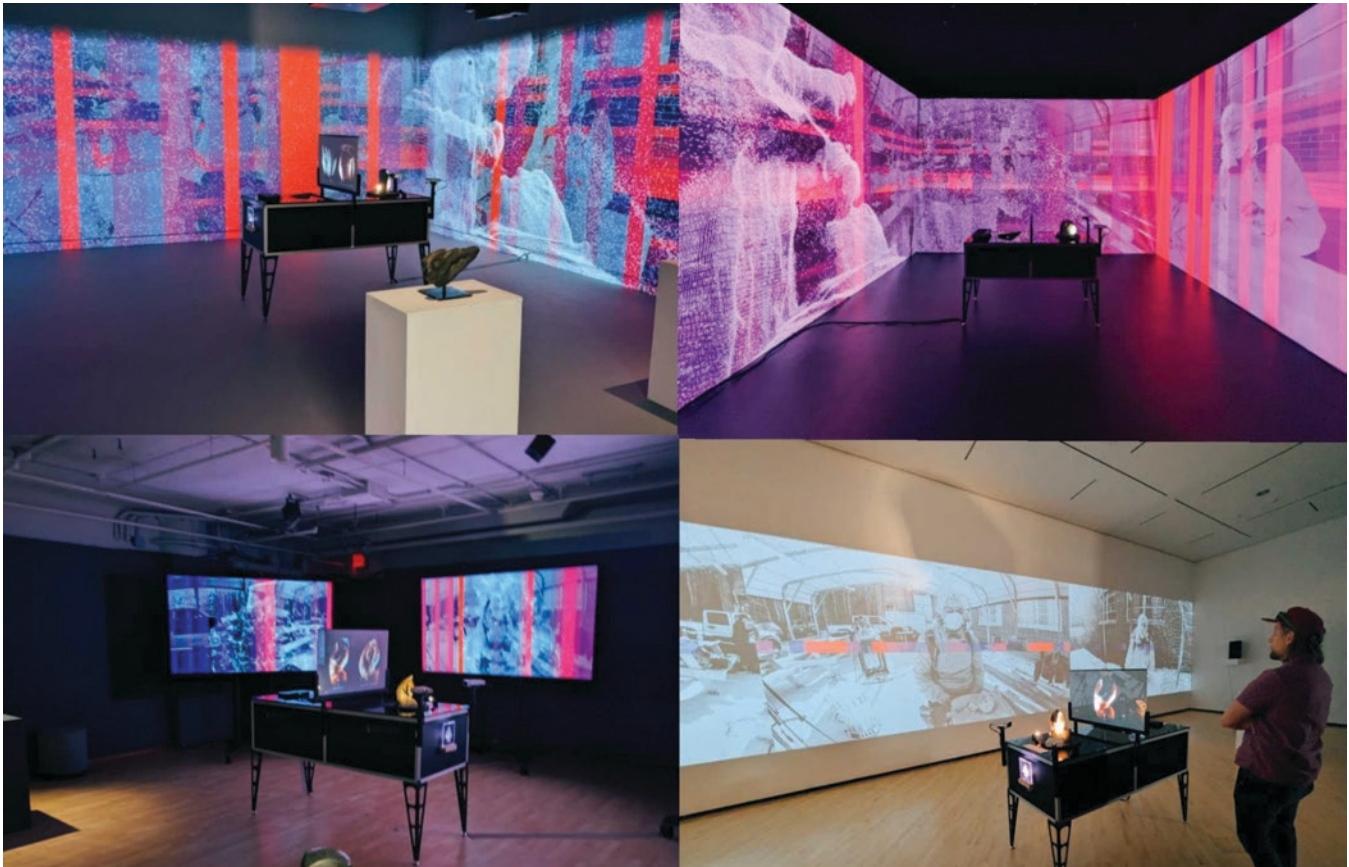
The installation invited visitors to see and touch a stone sculpture while also interacting with a virtual version of a sculpture located elsewhere. Participants could “feel” others engaging with the work at different locations while being immersed in visual and auditory representations of artists’ brain activity recorded during the sculpture’s creation.

“It’s one thing to look at data, statistics, or even art,” said McNair, a professor of engineering education. “It’s another



“CARVING OUT CREATIVITY” invited visitors to “please touch,” and have a shared arts experience with those at another installation location.

* Originally published by Virginia Tech News on February 24, 2025. Edited for length and content.



to see it, hear it, and feel it happening around you – and to touch it while feeling someone else touching it from somewhere else.”

Supported jointly by ICAT and the Innovation Campus through a Science, Engineering, Arts, and Design grant, “Carving out Creativity” grew from a desire to highlight the interconnected nature of Virginia Tech’s campuses. According to former ICAT Executive Director Ben Knapp, the project emerged from a call for proposals.

The selected proposal stood out for its creative approach to linking locations through touch and its investigation of shared brain activity using electroencephalography (EEG) technology.

“The beauty of this project was that it showcased interaction through the sense of touch across Virginia Tech communities,” Knapp said. “At the same

time, it demonstrated how the ancient practice of sculpting connected people through shared brain activity. It was both the tactile experience and the underlying neuroscience working together.”

The idea for the installation developed through conversations among McNair; Dushan Boroyevich, University Distinguished Professor of Electrical and Computer Engineering; and Hiromi Okumura, collegiate assistant professor of visual arts. McNair then approached ICAT multimedia designer David Franusich and immersive audio engineer Tanner Uptegrove with a concept inspired by those discussions and her experience with the Backyard Stone Carvers in Newport.

“ICAT is a place where you can let your imagination run wild and then figure out how to make it real,” McNair said. “I went to Tanner and David and asked, ‘Is this possible, or am I just dreaming?’”

To explore shared patterns of creativity, the team drew on the expertise of Julia Basso, a behavioral and neural scientist and assistant professor in the Department of Human Nutrition, Foods, and Exercise. Basso, known for her work



WATCH VIDEO

OPPOSITE: “Carving Out Creativity” was simultaneously installed at four locations: Academic Building One, the Cube at the Virginia Tech Center for the Arts, the Torpedo Factory Art Center, and the Taubman Museum of Art.

using EEG technology to study brain activity during movement and dance, adapted her methods to capture neural data during stone carving sessions with the Backyard Stone Carvers group.

The artisan group, founded by Darcy Meeker, who died in 2022, emphasized communal art creation and learning through touch – values that aligned closely with the project’s goals.

Additional collaborators included Atlas Vernier, a graduate student in industrial and systems engineering, and backyard stone carver Linda Correll.

As Basso’s team analyzed the collected EEG data, Franusich and Upthegrove focused on translating the research into an engaging public-facing installation.

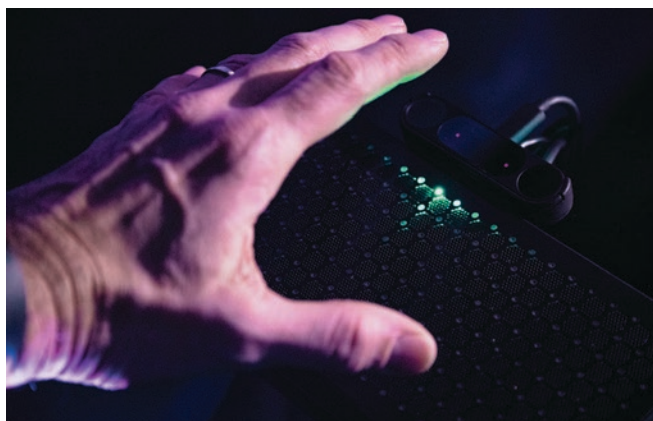
“We wanted to present the findings in a way that was accessible, informative, and compelling – and to do it through an art installation,” Upthegrove said. “Another challenge was intentionally separating parts of the experience by distance.”

The resulting installation featured four interactive kiosks, each pairing a physical stone with a virtual counterpart. Visitors could interact with the virtual stone using a haptic device, while those touching a real stone felt vibrations generated by participants at another location. Surrounding the sculptures were visualizations and sonifications of the brain data collected during the carving process, along with footage of the artists at work.

“You were experiencing the act of stone carving around you while interacting with finished pieces alongside someone in a different place,” Franusich said. “It raised the question: What does it feel



ABOVE: Virginia Tech President Tim Sands attends the opening of Academic Building One and interacts with the installation.



LEFT: An ultrasonic haptic device paired with hand-tracking allowed visitors to “feel” a virtual sculpture.

like to experience art together across distance?”

Franusich and Upthegrove said they hoped the project encouraged new ways of presenting complex data and expanded ideas about remote connection.

“Making remote connections more tangible, interesting, and empathic is an important next step,” Upthegrove said.

Knapp said the project exemplified the university’s strengths in immersive technology and cross-disciplinary collaboration.

“What made this project special was how it brought together computer science, neuroscience, art, and creative practice to connect university locations across the Commonwealth,” Knapp said.



A DETAIL view of the sculpture's mirror-finished endcaps, with Academic Building One in the background.

[Below] Braden Perryman (left), Rude Graves (center), and Damon Brewer (right) secure upper segments of "Emergence."

STUDENTS CREATE NATURE-INSPIRED SCULPTURE to welcome visitors to Alexandria

By Rodney Kimbangu*

ON A QUIET AFTERNOON, Braden Perryman stood beneath a Kousa dogwood tree and saw more than a seasonal bloom.

"I was looking at the form of the dogwood fruit. They are composed of all these little cells that combine to make a larger piece, the fruit," said Perryman, who graduated with a Master of Fine Arts in creative technologies in May 2025.

Inspired by the symmetry of the fruit and driven by the idea of connection and complexity, Perryman began sketching what would become a centerpiece of his thesis project and a public art piece.

The 8-foot public sculpture, "Emergence," stands on the green space near the Potomac Yard-Virginia Tech Metro station and adjacent to Virginia Tech's new Academic Building One in Alexandria. It was designed and constructed entirely by Virginia Tech students from multiple disciplines.

The sculpture was commissioned for Academic Building One and supported

by the Institute for Creativity, Arts, and Technology (ICAT).

It greets commuters and visitors alike while signaling the university's presence in Northern Virginia.

"This is a new Metro station, and this is an area that's rapidly developing. So 'Emergence' could be an interesting draw to get people over to this side of town," said David Baker, associate vice president and chief of staff for the Greater Washington D.C. Area. "It's something folks can walk up to, touch, take photos with, and hopefully, wander down the street to discover what's happening at Virginia Tech."

Set in a green space developed by JBG Smith, the installation is meant to be both a destination and a portal.

"The sculpture is an embodiment of different groups coming together to create something new at the center of next," said Baker, referencing Virginia Tech's expanded presence in Alexandria.

The piece was digitally designed then

constructed from Corten steel.

Perryman worked closely with Trevor Finney, who graduated with a Master of Fine Arts in creative technologies in December 2024, to guide a team of more than a dozen student employees through a complex, month-long fabrication process.

"In many ways, the sculpture is a byproduct. The real art is the community that came together to build it. Students from completely different majors collaborating and learning from one another, that's what this is really about," Perryman said. "I think it shows what students can do when they're trusted, given the tools and a real challenge." ■



SUPPORTED RESEARCH

Pushing the boundaries of what's possible

THE INSTITUTE FOR CREATIVITY, ARTS, AND TECHNOLOGY (ICAT)

centers its mission on the belief that creativity is a powerful tool for inquiry. Through projects that bridge disciplines, address societal challenges, and reimagine how knowledge is produced and shared, ICAT supports research that is as bold as it is impactful.

From immersive, data-driven environments to community-based initiatives and sensor-driven performance art, the following stories highlight how research supported by ICAT continues to chart new territory—uniting science, design, and human connection in ways that transcend traditional academic boundaries.



“DROSERÁ OBSCURA” is an immersive multi-sensory art installation that combines virtual reality, animatronics, sound, scent, and touch to blur the lines between digital and physical worlds. MORE ON PAGE 19

SCIENCE AND ART OF MOVEMENT

HOW CAN DANCE BECOME A TOOL FOR DISCOVERY, THERAPY, AND CONNECTION?

And how does movement shape the brain? In this section, we explore a groundbreaking fusion of technology and performance, where researchers and dancers use drones as collaborators, and brain imaging to study how movement sparks communication across regions of the brain—and between people. It's not just art for art's sake; it's choreography as cognitive catalyst.

HOW WE COLLABORATE: 'Daedalus Dreams'

By Melody Warnick*

TRANSDISCIPLINARY COLLABORATIONS are at the heart of a university's creative genius. But what makes them successful? For the "How We Collaborate" series, we asked collaborators to talk about the process of working together.

You expect to see three dancers on stage for a pas de trois like "Daedalus Dreams," which premiered in Virginia Tech's Creativity and Innovation District performance hall on Oct. 22, 2022.

You just don't expect two of the dancers to be drones.

Harnessing drones' capacity to create a meaningful on-stage narrative alongside a human dancer was one goal of the

collaboration among the trio of artistic faculty members who created "Daedalus Dreams": Zach Duer, assistant professor of creative technologies in the School of Visual Arts; Scotty Hardwig, assistant professor in movement, performance, and integrated media in the School of Performing Arts; and Eric Handman, associate professor in the University of Utah's School of Dance.

As Handman's former graduate student and Duer's colleague, it was Hardwig who linked the three over their mutual fascination with incorporating new technologies into artistic performances.

Then Handman received funding from the University of Utah and invited Duer and Hardwig for a one-week residency

in Salt Lake City in 2021, along with their new friends, two drones they named Andromeda and Betelgeuse. "It was at first Drone A and Drone B," said Hardwig, "and then we were like, 'This doesn't feel right.' They became more like dancers and less like drones over the course of the process."

Duer, Handman, and Hardwig spoke before the premiere of "Daedalus Dreams" to talk about how their long-distance, high-tech collaboration thrived.

What did it look like in the studio in Salt Lake City as you started working together?

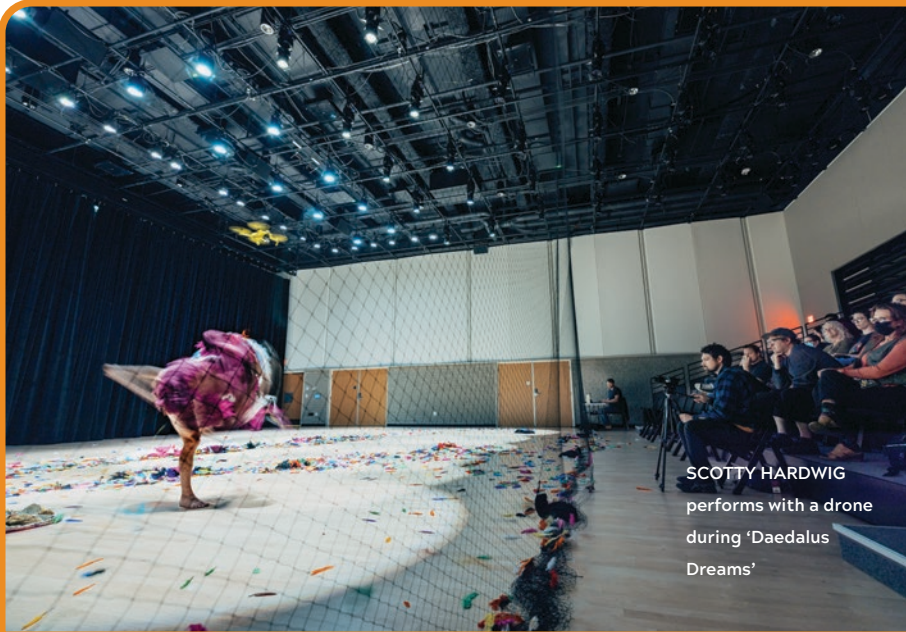
Scotty: Playing around. It was just a lot of experimentation. We showed up in

LEFT TO RIGHT:
Zach Duer, Scotty Hardwig,
and Eric Handman



Christina Franusich

Christina Franssich



SCOTTY HARDWIG
performs with a drone
during 'Daedalus
Dreams'

Zach Diers



the studio and didn't necessarily know what was going to come out of it. We had almost like an R&D phase to test the drones' tracking capabilities, test their momentum, their sensors. The idea of them as wind sources like mobile fans is something that came out of the blue. At the beginning, we had been talking about, could there be something with Greek mythology involved in this? Because there was just something weighty about drones as symbolic metaphors of birds, or as the Furies coming down in judgment.

Eric: And surveillance too, as these sort of godlike figures that are watching.

Scotty: As soon as we discovered the wind element, we brought in a bunch of feathers. That set us off on this whole journey that integrated the Daedalus myth. For a while we were like, "Is this Icarus's dance?" But then it became clear that this was Daedalus – his dance after the death of his son.

Eric: We're not really telling the Daedalus story, but it is sort of this touchstone.

Is there a division of labor among you three?

Eric: I feel like, in a way, this project is the vehicle for the collaboration. It's the collaboration that mattered to me. It doesn't matter what we're actually working on, I just felt like I wanted to be working with these guys. I have a lot to learn from them. I mean, as a joke – sort of – our division of labor is like, "These are the guys that handle all the technical stuff, and me? I sweep up the feathers."

Scotty: And give the notes at the end: "That was good, but feel it more." No, I'm kidding. One thing that the three of us have in common is that we're all artists. We've all done live shows before. We kind of have a baseline of knowledge that we can share, and so those pieces of who's going to do what kind of just fall into place. We've also all been in processes that have vague, nebulous, shifting boundaries and expectations. And I think artists are very comfortable with that.

What does it feel like to trust your collaborators?

Eric: I feel trust as a kind of enthusiasm and excitement that the project is in good hands. We have this very organic space where ideas can be thrown in,

tried out, tested, discarded, accepted, and it's all kind of good, right? We're all invested in making a better and better piece. Some ideas really work and are doable. Other ideas we might shelve for a while.

Zach: Having history together really helps. In this collaboration, even though Eric and I didn't know each other, we both knew Scotty and had worked with Scotty several times for a duration of years.

Scotty: Over the last five or six years, I've been collaborating a lot, a lot, a lot. I think that's part and parcel of being a dancer and a choreographer. And I've had varying degrees of success with my collaborations. Some of them were amazing smash hits—I think this one was one of those—and others were a little more rough. Looking back on why they were rough, I think it was partially because the agreements were not clear going in. People had different expectations about what it was going to be. In any kind of relationship, when expectations and agreements get suddenly shattered, it's like, "Wow, we really should have talked about that before we started this." ■

THE SCIENCE AND ART OF MOVEMENT (SAM) LAB is one of the Institute for Creativity, Arts, and Technology (ICAT) studios where researchers explore different approaches to collaboration and research. Located in the Sandbox Studio, the SAM Lab is a faculty-led initiative that unites the arts, engineering, and neuroscience. It began as a vision by Ben Knapp, the former director of ICAT, when he saw potential in a studio space once used by the Center for Human-Computer Interaction.



That insight sparked questions. What kind of research requires vertical space? What does it mean to observe motion from above? Who at Virginia Tech studies movement in a way that could harness such a space?

Epiphany Machine, one of SAM Lab's projects, captures the ethos of the lab. Motion is both subject and method. Performers wear EEG caps that transmit neural activity in real time. As they move and interact with each other and their environment, their brain data is processed and transformed into dynamic visuals projected on a cyclorama behind them. ■

Photos by Rodney Kimbangu



JULIA C. BASSO and Scotty Hardwig perform in "Epiphany Machine," a collaboration that combines dance and neuroscience. Hardwig (left) wears an electroencephalography cap during a performance of "Epiphany Machine."

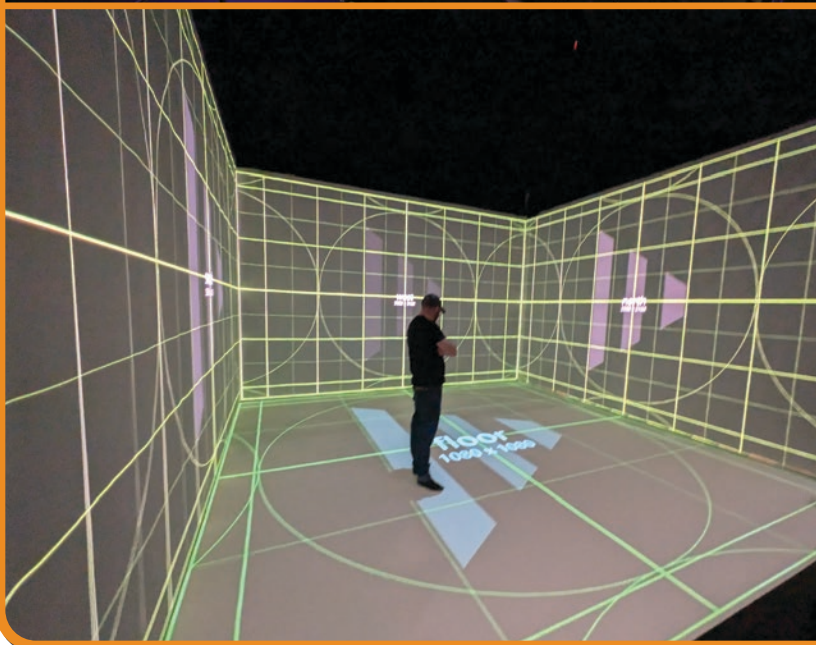


IMMERSIVE EXPERIENCES

WHEN RESEARCH LIVES INSIDE THE STORY, new forms of understanding emerge. This section explores virtual reconstructions of ancient worlds, data-driven sonic landscapes, and tactile experiences that reveal the shape of change. Supported by the Institute for Creativity, Arts, and Technology (ICAT), these immersive projects unite artists, engineers, designers, and scientists to create multisensory experiences that educate, provoke, and inspire.

NEW IMMERSIVE PROJECTION SYSTEM

TO SUPPORT IMMERSIVE PROJECTS, ICAT recently designed and implemented a new 17-foot square, 11-foot high, four-sided (three walls and floor) display system in the Cube. The system, currently called the Cube High Immersion Projection System (CHIPS), offers a flexible tool that allows users to share experiences in virtual environments. It also provides a high-resolution platform for moving-image artworks and simulations.





“BREATHING LIFE into Meketre’s Tomb” is exhibited in the Cube on ICAT Day on May 5, 2025.

ANCIENT EGYPT COMES TO LIFE through virtual reality

By Jimmy Robertson*

SOMEWHAT SHY but also inquisitive, Sarah Zulficar often found herself wondering why the professor in her studio class sometimes would disappear into a small room at the edge of the studio area.

“I was always like, ‘Oh, what is that?’” Zulficar said. “And she showed us a few of her projects that she was working on at the time. When my junior year came along, I asked her if I could come in and see what they were doing and maybe help, and she recruited me as a research volunteer. That transferred into a part-time job.”

Zulficar, from Ashburn, Virginia, joined an intriguing interdisciplinary project that involves digitally reconstructing and reimagining artifacts and life in Egypt more than 4,000 years ago. Led

by Eiman Elgewely, assistant professor in the College of Arts, Architecture, and Design, and funded by the Institute for Creativity, Arts, and Technology (ICAT) and the Center for Human-Computer Interaction (CHCI), the project includes faculty and students from architecture, interior design, computer science, and creative technologies.

Specifically, the project – officially “Breathing Life into Meketre’s Tomb Models in VR: A Spatial Storytelling Immersive Experience” – entails taking artifacts and drawings of relics from the tomb of Meketre, an Egyptian official during the 11th dynasty whose tomb was found in Luxor in the late 1800s and excavated by American archaeologist Herbert Winlock in 1920, and using digital technology to allow people to step inside the world of ancient Egypt.

“Currently, these artifacts are displayed at the Metropolitan Museum of Art [in New York City] and at Cairo Museum [in Egypt,” Elgewely said. “It’s a very common story of many artifacts that came out of Egypt now scattered in museums worldwide. I have been exploring how digital technology can enable a form of digital repatriation, offering both Egyptians and a global audience access to these cultural gems.”

Those drawings prompted Elgewely to put together a Virginia Tech team to create digital replicas, using digital technologies such as 3D printing. They created a 3D visual model of Meketre’s garden courtyard, but to do so, they first needed more information.

“I was in charge of finding as many authentic paintings as I could find relating

Rodney Kimbangu



to Egyptian gardens,” Zulfiqar said. “I did a lot of research on native plants, trees, flora, and fauna. We put that all into our reconstruction and made it as historically accurate as possible.”

“We did extensive research based on references from tombs and temples in ancient Egypt,” Elgewely said. “Drawings showed us a pool, the type of fish they used, the type of trees, and the very exact types of plants that were in ancient Egypt. You can see how we apply textures, materials, lighting from that era, capturing even the symbolism in the garden and architectural design. Many stories come to life through this 3D visualization. We are also developing authentic sound effects, including accurate bird sounds, to create a fully multisensory immersive environment.”

Deepak Gupta '24 pursued a master's degree in computer science from Virginia Tech solely to work in the areas of virtual reality (VR) and machine learning.

He jumped at the opportunity to work with Elgewely on the Meketre garden project, which eventually became a 3D model that could be used in animation, on a website, or as a VR application.

Gupta used Unreal Engine, which is a 3D creation tool, to create the interactive exhibition and to add the interactions. For example, he used artificial intelligence (AI) to guide the behavior of fish in the garden pool.

A version of the project was unveiled at the Virginia Tech Science Festival held at the Center for the Arts in 2024. Young children were allowed to put on the VR headset and view Meketre's garden while gaining a bigger perspective of Egyptian life in those days.

“The kids loved it,” Gupta said. “They were trying to catch the fish and play with them. So we thought, ‘Why can't they catch the fish?’ I wondered if maybe they could—let's have them catch the fish so they can play with them. There are flowers around the pond, so maybe they can pick some. These are the things we then added.”

“People are asking, ‘How can we experience the space before it's even built?’” Zulfiqar said. “So there's a large future. There's a lot of scope for AI in terms of helping us with the design process and then using virtual reality to engage



David Franusich

clients a little bit more and maybe build a different clientele.

The team continued to add the final elements to the Meketre project, such as voice narration in different languages and music. They successfully completed an exhibition of the project in the Cube within the Center for the Arts on ICAT Day on May 5, 2025, allowing the public to experience the work firsthand.

At the least, however, Elgewely and her team have constructed a new way of learning to expose future generations to ancient cultures.

“Growing up in Egypt is like growing up in an architecture history book, being exposed to all of this, but I noticed that people still need to be more engaged,” she said. “They're not very much interested in visiting museums to view artifacts behind glass cases. Perhaps there are new ways now to approach this, especially with generations of young people growing up with technology. Maybe we can truly help them really understand and appreciate it with new media.” ■

IMMERSIVE POETRY EXHIBIT honors the memory of Nikki Giovanni

Words and photos by Rodney Kimbangu*

ON THE ANNIVERSARY OF NIKKI GIOVANNI'S PASSING, an opportunity to be immersed in her presence and poetry was available at Virginia Tech.

On Dec. 9, 2025, six of the acclaimed poet's works were transformed into the "Nikki Giovanni Immersive Experience" inside the Cube. During the 15-minute multimedia exhibit, users experienced recordings of Giovanni reading the poems combined with visuals and music tailored to the poetry.

"We're using multiple senses to engage audiences," said Meaghan Dee, associate professor of graphic design and project team member. "We think it will be really meaningful to the community, especially with it being on that day."

The installation is on display at the Torpedo Factory Art Center in Alexandria until May 17, 2026.

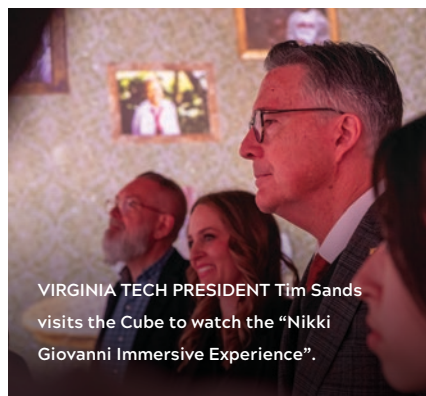
A University Distinguished Professor Emerita, Giovanni died on Dec. 9, 2024, having spent 35 years as a professor in the Department of English.

Giovanni's poems are well known for exploring themes of childhood, joy, loss, and Black identity. Members of the project team said their hope was for visitors to connect with those same themes through familiar stories, music, and images.

Supported by the Institute for Creativity, Arts, and Technology (ICAT) and funding provided by the Office of the President, the experience was created by an interdisciplinary team of faculty and students.

"Nikki Giovanni's life and work captured so much of our university's spirit, culture, and character over more than three decades," said Virginia Tech President Tim Sands. "We wanted to give our community a special opportunity to experience her words and presence, and the Cube's immersive technology provides the perfect venue."

The exhibit built on a smaller version of the "Nikki Giovanni Immersive Experience" that debuted in June 2025 to coincide with Giovanni's public memorial



VIRGINIA TECH PRESIDENT Tim Sands visits the Cube to watch the "Nikki Giovanni Immersive Experience".

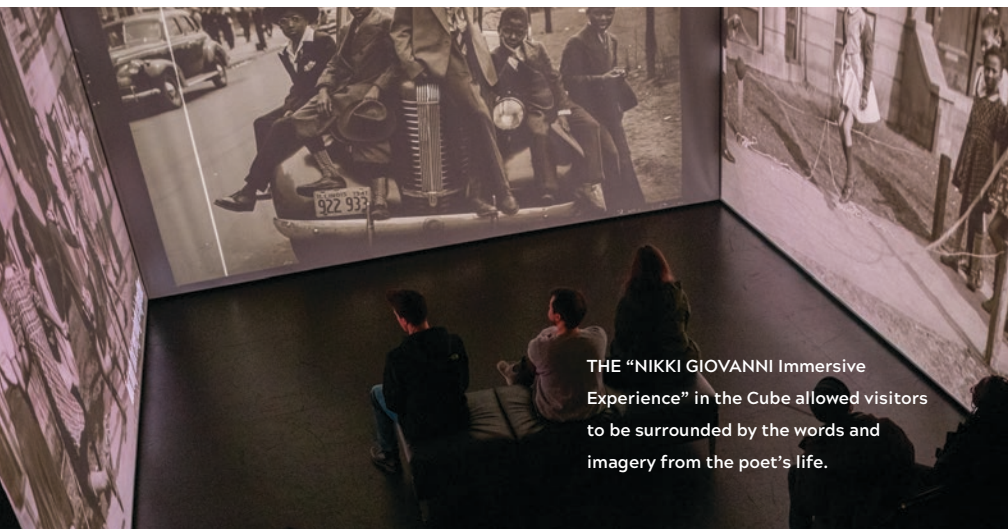
service. That installation included two poems, "Ego Tripping" and "Nikki Rosa."

Using the Cube's high-density loud-speaker array, visitors were surrounded by sounds, including having Giovanni's voice, as recorded at different times in her life, move with them throughout the exhibit.

"When you're seeing the visuals paired with Nikki's voice, it gives you a better understanding of who Nikki was," said Demetria Dye, a junior majoring in graphic design who worked on the project. "The visuals really help elevate her voice."

The project team was assembled in 2024, prior to Giovanni's death, and Dee worked with Giovanni's wife, Virginia Fowler, to get consent to work with her poetry. Giovanni's close friend Gena Chandler helped select the poems most reflective of the themes of the poet's work and life.

"She was a uniquely wonderful, sensitive, thoughtful, intelligent, brilliant human being and artist," said Chandler, associate professor of English. "She lived a full, rich life, sharing her art and her imagination with the world." ■



THE "NIKKI GIOVANNI Immersive Experience" in the Cube allowed visitors to be surrounded by the words and imagery from the poet's life.

TOYSPHERE

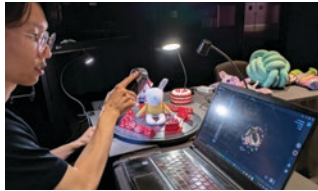
WHAT IF FORGOTTEN TOYS live again in virtual reality?

Could this help families let go and share them with others? ToySphere is an interdisciplinary research project and interactive platform that stores virtual versions of forgotten or disused toys in a digital space. Each toy is accompanied by a child's story, fostering new connections while preserving emotional value and supporting timely decisions about sharing and reuse. The project examines product hibernation – a common behavior in which unused items are kept in closets. We 3D-scanned 33 disused toys and reimagined them as virtual reality replicas to explore future possibilities for toy sharing. ■

Yoon Jung Choi // College of Architecture, Arts, and Design

Myounghoon Jeon Philart // College of Engineering

Sang Won Lee // College of Engineering



David Fransulich



LIMINAL SPACES

LIMINAL SPACES IS AN IMMERSIVE 15-minute, fixed-media composition that uses the capabilities of the Cube to immerse participants in sound. This unique composition invites people to experience music in an unprecedented way, as a plunge into the time between what was and what comes next. It had its first performance in November of 2022, allowing audiences to explore the time that exists between morning and night, near and far, calm and storm. ■

Ben Knapp // Institute for Creativity, Arts, and Technology

Eric Lyon // College of Architecture, Arts, and Design



WATCH VIDEO

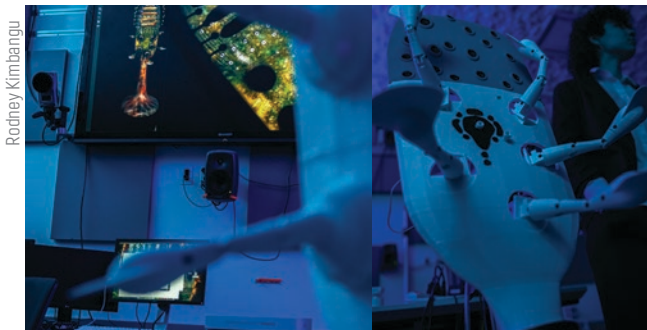
DROSERA OBSCURA

DROSERA OBSCURA IS AN IMMERSIVE multi-sensory art installation that combines virtual reality, animatronics, sound, scent, and touch to blur the lines between digital and physical worlds. By integrating various sensory elements, this installation invites participants to experience a deeper, more engaging form of interaction, exploring how technology can evoke emotion and connection. This project is designed to inspire and captivate audiences, showcasing the potential of XR to create immersive experiences beyond sight and sound alone. ■

Thomas Tucker // College of Architecture, Arts, and Design

Tohm Judson // University of Washington

Matthew Swarts // Georgia Tech



Rodney Kimbangu

COVID COMICS, CUBED

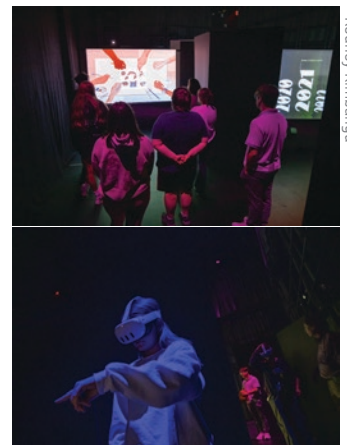
COVID COMICS, CUBED, which premiered in September 2024, sought to raise the power of pandemic-era webcomics – to “cube” them, so to speak – through the technological affordances of the Virginia Tech’s Cube. The project leveraged immersive and augmented reality (AR) technologies to bring comics storytelling to three-dimensional life. Audiences navigated a virtual cityscape, moving through “typical” COVID scenarios. Throughout this narrative journey, the project blended comics art, immersive soundscapes, and augmented dataspace to dramatize the power of comics as a vector of collective memory, coping, community-building, and public health literacy. ■

Rachel Paine // College of Architecture, Arts, and Design

Emmy Waldman // College of Liberal Arts and Human Sciences

Avery Wiscomb // College of Liberal Arts and Human Sciences

Doug Bowman // College of Engineering



Rodney Kimbangu

Immersed in INVADED SOUNDSCAPES

By Travis Williams*
Photos by David Fransulich

WHEN MEMBERS OF A SPECIES INVADE a new area, they do more than alter ecosystems – they also change how those ecosystems sound. A transdisciplinary research project led by Virginia Tech’s Jacob Barney and Meryl Mims examined how invasive species affect not only biodiversity but also the acoustic character of landscapes. With support from Virginia Tech’s Institute for Creativity, Arts, and Technology (ICAT), the research was translated into the immersive public experience, “Acoustic Invasion,” in the Cube at the Center for the Arts at Virginia Tech in spring 2023.

“We wanted to measure, record, and document sound changes in ecosystems while also creating an experience that used the data to reveal a new dimension of species invasion,” said Barney, associate professor of invasive plant ecology.

The installation allowed visitors to hear contrasting soundscapes – environments before and after invasive species were introduced. One example focused on the American bullfrog, a damaging invasive species and the subject of long-term research in Mims’ lab.

“You’ll be able to hear what a pond might sound like without invasive species and then what happened when we overlaid that audio with bullfrogs,” said Mims, associate professor of biological sciences, prior to the exhibit’s debut.

“Acoustic Invasion” was featured as one of approximately two dozen projects

during that year’s ICAT Day, the institute’s annual public showcase of transdisciplinary research. The exhibit was also later open to the public during specific hours.

Artist and multimedia designer David Fransulich translated scientific data into a self-guided, immersive installation spanning landscapes in southeast Arizona and Southwest Virginia. The exhibit incorporated imagery, spatial audio, and 360-degree video to transport visitors into ecosystems undergoing ecological change.

“At ICAT, this is what we do,” Fransulich said. “We bring artists and designers together with scientists to make research accessible and engaging for the public.”

The project emerged from the Global Change Center’s Invasive Species Working Group, directed by Barney and housed within the Fralin Life Sciences Institute. Fieldwork included weeks of data collection in the Huachuca

Mountains of southeast Arizona and comparable sites in the Appalachian Mountains of Southwest Virginia and was influenced by the interdisciplinary collaboration.

“Working with artists changed how we thought about our science,” Barney said. “It also allowed us to turn complex research into something people could see, hear, and experience in a meaningful way.” ■



READ COMMENTARY PIECE
IN *FRONTIERS IN ECOLOGY*
AND *THE ENVIRONMENT*



TOP: The “Acoustic Invasion” immersive installation in the Cube at the Virginia Tech Center for the Arts. BOTTOM: Researchers used audio and video recordings from both Arizona and Virginia to study how invasive species change ecological soundscapes.

Community Building

FROM PUBLIC CHOIRS to food pigment workshops to inclusive game design, this section highlights projects that use creativity to bring people together. These efforts—often driven by principles of co-design and accessibility—underscore the role of the Institute for Creativity, Arts, and Technology (ICAT) in building technologies, installations, and communities rooted in empathy, agency, and participation.

The magic of turning FOOD WASTE INTO PAINT PIGMENTS

By Rodney Kimbangu*
Photos by Yoon Choi

FOR YOON JUNG CHOI, designing changes in human behavior has led to turning food waste into works of art.

“I always wanted to rethink my job roles in the packaging industry and do my own thing, but I often wondered what I could do to impact society positively,” said Choi, assistant professor in Virginia Tech’s College of Architecture, Arts, and Design.

In 2023, Choi launched “Food Magic,” which utilized a multistream recycling approach to capture food waste that can be transformed into natural powder pigments for art. According to Grist.org, the U.S. Department of Agriculture’s National School Lunch Program alone wastes approximately \$5 million worth of edible food daily.

Before moving to America for her faculty appointment, Choi visited K-12 schools in Blacksburg to find a potential school for her children. She witnessed an enormous amount of food being wasted at schools; that experience troubled her.

“How much food was not eaten yet thrown away in the cafeteria was a culture shock to me. I had never actually witnessed anything like that until that very moment,” said Choi, who previously lived in England.

Choi’s effort to recycle food waste focused on changing behaviors and utilized a co-design approach, which incorporated feedback from users throughout the creation process.

She collaborated with Lee Worley, one of three art teachers at Blacksburg Middle School, to begin a school-wide food recycling effort and conduct a two-day art workshop with his eighth grade students.

“People often get confused about what goes where, when, and why. So we designed these three color-coded bins to guide them in the sorting,” Choi said.

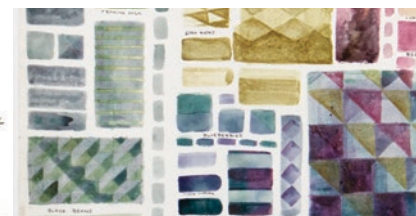
Over a few weeks, the 3D-printed bins collected green, orange, and purple foods from more than 1,000 students in the school’s cafeteria.

The extraction of pigment from the food worked by adding the waste into an extractor and boiling its content.

Unlike many commercially available paints, the pigments produced during this process can decay back into the environment.

“Once artificial paints dry out, they get thrown away or go through the sewage

EVERY GENDELL demonstrates how to use the paint made from foods.



system, thus polluting our waters and ecosystems,” Choi said.

As a part of the workshops, Choi used feedback cards and informal conversations to gauge the impact it had on the students.

According to the responses, 90 percent of students surveyed reported learning food waste has value by being converted to natural paint and 61 percent said they want to share this new knowledge at home. ■

* Originally published by Virginia Tech News on July 8, 2024. Edited for length and content.

Music therapy HITS A HIGH NOTE with community choir

By Kelsey Barlett*

Photos by Jasmine Rorrer

EVERY THURSDAY EVENING for an hour and a half, the performance hall at Virginia Tech's Creativity and Innovation District came alive with the sound of music.

And laughter. There's plenty of that, too.

Classic rock 'n' roll songs resounded as members of The Beat Goes On, a community choir that includes individuals with dementia and their caregivers, came together in song. The group's debut concert was held on campus in April 2024.

Joanna Culligan, instructor of human development and family sciences at Virginia Tech and the Engagement Center for Creative Aging's therapeutic program manager, is the choir's director.

Culligan and Patricia Winter, the choir program's co-director, are music therapists. They have worked together for years to understand how music improves quality of life for people living with forms of dementia, especially Alzheimer's disease, and their caregivers.

"One of the things that happens a lot is that people start to isolate, and they don't engage in a lot of the things that they used to do," Culligan said of people who experience cognitive change.

"We were just talking about it, and we were like, 'Let's make a choir that really

includes everyone,'" she said. "Let's have it open. No audition—people can come and sing and just experience joy and music making."

That conversation began in 2023. The center received a grant from Virginia Tech's Institute for Creativity, Arts, and Technology that enabled Culligan to start the choir. Community members and students were invited to participate. More than 30 individuals participated in the choir's 2025 concert.

how heart rate variabilities compare while singing and during breaks. Participants also are asked to fill out a form before and after each rehearsal describing how they feel. The team uses the data to analyze how the choir impacts individual well-being.

"There's a lot of laughter that happens and a lot of joy in the room," said Tanner Upthegrove, immersive audio engineer for the Institute for Creativity, Arts, and Technology.



THE BEAT GOES ON performs during its April 29 concert debut

Aside from the important social benefits that the program provides, the choir also is an opportunity for Culligan to measure the impact that music has on a person's well-being.

Members wear watches during rehearsals that monitor heart rate variability to measure their stress levels. Culligan and her team analyze the data to determine

Winter said she has watched many members of the choir go from timid and not knowing any of the words to singing along and tapping their feet, a feat that many don't expect from people with dementia.

"People with dementia can learn to do new things," she said. "They can learn the words to a novel song. They can participate in these activities."

Culligan hopes that the choir will become a permanent fixture in the community.

"One of the overarching goals that we have at the Engagement Center for Creative Aging, through all the work that we're doing here, is really to destigmatize aging and dementia," Culligan said. "We want people to feel comfortable interacting with older adults because they're just people." ■

OPEN THE GATES GAMING

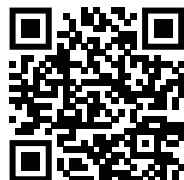
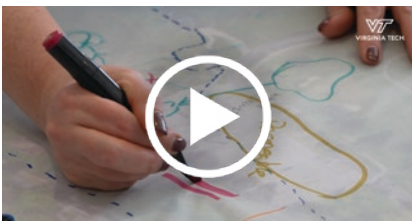
Open the Gates Gaming (OtG) originated during the COVID-19 pandemic in response to barriers faced by disabled players. OtG began working with the disability community to develop cognitive access tools for Dungeons and Dragons. In 2025, the team tested and released a suite of clear, flexible visual tools that support participation, comprehension, and agency in play. These tools have proven useful not only for players with cognitive disabilities but also for those with limited time and competing demands on their attention. OtG has also broadened its scope to create playable narrative adventures based on opera and has begun conversations with industry partners interested in accessibility-forward design. ■



Elizabeth McLain

- Elizabeth McLain** // College of Architecture, Arts, and Design
- Christopher Campo-Bowen** // College of Architecture, Arts, and Design
- Gustavo Araoz** // Institute for Creativity, Arts, and Technology
- Scott Hanenberg** // Penn State University

LEARNING LANDSCAPES



WATCH VIDEO

PLAYING COVID PROTEINS

- Charles Nichols** // College of Architecture, Arts, and Design
- Deborah J. Good** // College of Agriculture and Life Sciences



WATCH VIDEO

MISREGISTRATION

At its core, “Misregistration” explores how information is concealed, detected, and revealed. Beneath the surface, it delves into introspection, examining the many ways hidden information operates – whether as a tool for amplifying voices suppressed by oppression or as a means of spreading and uncovering misinformation. Expanding across sensory dimensions, “Misregistration” features a 3D-printed book integrating augmented reality technology alongside a dance performance that experimented with new, inclusive choreographic techniques. The performance embraced the strengths of individuals with disabilities, incorporating touch, sound, and echolocation as alternative methods of communication. Sonification of art, and “Moiré Fringe,” a new composition by Charles Nichols, embraced spatial audio technologies to represent hidden information.



Ethan Candelario

“Misregistration” was presented at the Bechtler Museum of Modern Art, Charlotte, NC, on the occasion of the opening of Janet Biggs’ exhibition “Collection, Reframed: We Are Here, Beyond Vision,” July 11, 2025 and at the Cube at ICAT, Virginia Tech, May 2025. ■

- Agnieszka Międlar** // College of Science
- Paul Cazeaux** // College of Science
- Tanner Uphthegrove** // Institute for Creativity, Arts, and Technology
- Janet Biggs** // Independent Artist
- Davian Robinson** // Independent Artist

Student Projects

CREATIVE RESEARCH at the Institute for Creativity, Arts, and Tehcnology (ICAT) flows not only from faculty but also from student curiosity. This section highlights original work led by student teams exploring topics that range from sustainable design to multimedia performance. Whether using virtual reality, biomaterials, fashion, or storytelling, these projects reflect the energy, experimentation, and collaborative spirit that ICAT fosters across disciplines.



Andrew Rodgers



Rodney Kimbangu

VDR SOUNDS VS SIGHT

VDR SOUNDS VS SIGHT MERGED FASHION and audiovisual elements to craft a truly abstract artistic experience. Audiences witnessed a departure from the traditional fashion show, where boundaries were shattered, transforming the runway into a dynamic artistic performance.

Utilizing the sandbox space provided a unique opportunity and challenge. Experimenting with content types and styles required trial and error to achieve the desired look and feel. Along with unique projections, all audio was crafted from scratch for full immersion.

The handmade outfits and trained models added to the experience. Creating a fully in-house show from scratch required integrating technology in every artistic aspect. ■

Andrew Rodgers // College of Engineering

Carter Roberts // College of Architecture, Arts, and Design

Rhian Batts // College of Science

Tre' Bailey // Pamplin College of Business

Bryanna Taylor // College of Liberal Arts and Human Sciences

MYCELIUM MIMETICS

MYCELIUM MIMETICS IS A CREATIVE exploration of mycelium networks and their potential applications in art and design. Nature, through billions of years of evolution, has optimized countless systems and organisms that serve as sources of inspiration.

Mycelium, the root-like structure of fungi composed of hair-like filaments called hyphae, offers a model of natural intelligence applicable to art and design. Its patterns and behaviors can inform the creation of forms, problem-solving approaches and optimized outcomes.

The project demonstrates that mycelium can be leveraged not just as an idle material, but as something we can learn from and work with.

By creating a “dialogue” between humans and fungi, the work examines growth pathways, nutrients and various fibers in which different strains of mycelium thrive, exemplifying mycelium’s ability to replace unsustainable materials in art and design at an increased scale and scope. ■

Avery Gendell // College of Architecture, Arts, and Design

Eva Thornton // College of Architecture, Arts, and Design



STORIES OF MIGRATION

STORIES OF MIGRATION IS A MULTIMEDIA art performance with live harp, electronic and computer music, video projections, dance, and movement telling stories about (im)migration.

Free and open to the public, it was performed on March 4 and 5, 2025 in the Cube at the Center for the Arts. It had music composition, computer programming, and sound spatialization by Brandon Hale; set design and stage management by Nia Perez-Vera; choreography and dance by Chynna Golding; and video art and harp playing and direction by Aline de Souza, as part of her arts-based Ph.D. research.

The team interviewed people who immigrated to Blacksburg and included their voice and drawings in the performance. This project was sponsored by ICAT through the Roger and Debbie West Student Grant. It was also supported by donations from members of the Blacksburg community. ■

Nia Perez-Vera // College of Liberal Arts and Human Sciences

Aline de Souza // College of Liberal Arts and Human Sciences

Brandon Hale // Institute for Creativity, Arts, and Technology



STUDIO PLAYDATE

EMERGING EDUCATIONAL RESEARCH in the fields of user experience, human-computer interaction, mechatronics, industrial design, and general STEAM education has increasingly demonstrated the efficacy of design sprint methodologies in promoting positive educational outcomes for students.

Studio Playdate applied the fundamental principles of design sprint towards the unique challenges that artists face as members of transdisciplinary teams in professional settings.

Artists, unlike designers or engineers, are typically tasked with answering holistic questions that are not problem-or-solution-oriented, but rather concerned with questions of fittingness (i.e., is the artwork appropriate in its social context?), aesthetics (i.e., does the artwork conform to or challenge normative beauty standards?), and ethics (i.e., does the artwork support or challenge the status quo?).

Through Studio Playdate, workshop participants moved closer to holistic thinking through a series of cooperative and competitive games and challenges that created the conditions for generative play. ■

Ben Hornyak // College of Architecture, Arts, and Design

Braden Perryman // College of Architecture, Arts, and Design

Kathleen Bailey // College of Science

Trevor Finney // College of Architecture, Arts, and Design

EXTERNAL PARTNERSHIPS

Expanding impact through collaboration

THE INTEGRATIVE MISSION OF

the Institute for Creativity, Arts, and Technology (ICAT) extends beyond campus. Partnerships span industries, cities, and communities. From immersive design work with the National D-Day Memorial Foundation to innovation workshops with Amazon HQ2 and the City of Alexandria, ICAT is redefining what it means to collaborate. These partnerships connect academic expertise with real-world applications, creating opportunities for public engagement, commercial innovation, and cultural transformation. Each project reflects ICAT's core belief: when people work across boundaries, they create experiences and impact that none could produce alone.



Craig Newcomb

HIROMI OKUMURA (left) leads a discussion on natural pigment techniques at the Torpedo Factory Art Center in Alexandria, Va..

ARTS AND TECHNOLOGY

highlight new academic, industry, and government partnership

By Rodney Kimbangu*

EMILY FIELDER RECENTLY BEGAN seeing fruit in a whole new light as the result of a new collaboration.

“At home, I was eating blueberries and kept thinking about its pigment in a completely different way,” said Fielder, a learning experience designer at Amazon.

Fielder was one of many Amazon employees who have taken part in one of the monthly workshops created through a partnership between the company, Virginia Tech’s Institute for Creativity, Arts, and Technology (ICAT), and the Torpedo Factory Art Center in Alexandria.

Aimed at creating a knowledge exchange between academia and the workforce, each event includes a presentation of an art-related technique or technology from Virginia Tech faculty members, followed by experimentation.

Fielder attended the “Transforming Food Waste into Vibrant Watercolors” workshop, which she found both nostalgic and eye-opening.

The topics for the sessions range from the use of artificial intelligence for writing to exploring the dynamics of projection mapping.

“Innovation happens when creativity and technology collide,” said Ben Knapp, former executive director of ICAT.

The workshop held at Expressions Lab at Amazon’s HQ2, brings together Amazon employees for a day of creativity. The following day, the same session is held for the public at the Torpedo Factory Art Center.

Hosting at two locations extends an opportunity to participate for artists and

said Brett Johnson, curator of artistic advancement of Alexandria’s Office of the Arts (now executive director at the Delaware Contemporary).

In 2022, Johnson and David Baker, associate vice president and chief of staff for the Greater Washington D.C. Area, explored ways to integrate art into Virginia Tech’s new building in Alexandria. They saw an opportunity to collaborate with industry partners.

Baker connected Johnson with Knapp, which led to a collaboration between ICAT and the City of Alexandria for exhibitions and performances.

Originally a weekly artistic exploration series, “Amazon Expressions” expanded in August 2024 to include Virginia Tech and Alexandria’s Office of the Arts.

Keeping true to its mission of creating a two-way knowledge exchange, “Amazon Expressions” isn’t just inspiring attendees, but is also fostering curiosity among the workshops’ leaders.

For Eric Lyon, professor of music who led the Spatial Audio workshop, the real value of this collaboration lies in its experimental nature. ■



Craig Newcomb

ERIC LYON leads the workshop, “Spatial Sound,” in the Expressions Lab at Amazon HQ2.

lifelong learners throughout the community and bolsters efforts to strengthen local talent pipelines and innovation hubs in the D.C. area.

“Our goal is to inspire people to think more creatively, embrace technology, and see art as a tool for problem-solving, not just as an aesthetic practice,”

* Originally published by Virginia Tech News on March 26, 2025. Edited for length and content.

THE FUTURE of Health Care

By Mason Adams*

Photos by David Franusich

FOR AN EXAMPLE OF HOW UT PROSIM (That I May Serve) undergirds Virginia Tech's approach to the future, consider how an array of colleges, institutes, and programs all are working to improve the design of medical facilities.

Industrial design faculty in the School of Architecture + Design partnered with faculty in the Fralin Biomedical Research Institute and Virginia Tech Carilion School of Medicine on projects ranging from working with wounded veterans to address their unmet health care needs to partnering with the health care industry to redesign hospital treatment rooms in ways that offer more-efficient tools for doctors while improving the patient experience. Since the pandemic, that effort has increasingly grown to include telemedicine advances as well.

"We're finding more and better ways to engage with companies and move new discoveries made at Virginia Tech into the marketplace. That process extends their benefit to more people in the world and helps fulfill an imperative of our service ethic and mission as a land-grant university," said Associate Vice President for Innovation and Partnerships Brandy Salmon.

The Institute for Creativity, Arts, and Technology (ICAT) partnered with Steelcase, a workspace design company, and built a team that included members from the Fralin Biomedical Research Institute, College of Architecture, Arts, and Design, and College of Engineering to reimagine the hospital workspaces. The team interviewed and observed real-life emergency procedures and workflows in multiple Carilion Clinic hospitals to get better information to clinicians and doctors when and where



they need it.

The ICAT team drew inspiration from unexpected places:

- Technology used by rideshare apps, which allows clinicians to see the arrival time and location of ambulances and EMTs.
- Way-finding Bluetooth technology that allows clinicians to see what's happening throughout the unit, even when they're not physically present.
- Cockpit-style monitors that show each patient's vital signs and a camera feed from the hospital room, as well as specialized displays outside each room that allow clinicians to view important information from the hallway.

Because of Virginia Tech's close partnership with Carilion Clinic, its researchers were grounded in the day-to-day reality

of what works and what doesn't in a real-world setting.

"We worked closely with Steelcase to look at what are the workflows and how can workflows change as we provide more technology to the environment," said Tom Martin, former ICAT's deputy executive director and a professor of electrical and computer engineering. "We want to provide more situational awareness for the team – who's in the room, who needs to be in the room. Particularly in emergency situations, rooms can get very crowded, and it's hard to figure out who should be in the room and who shouldn't."

The team's work was a critical first step that informed the design of products to be used in hospitals, but may also be applied to other areas of work.

The university supports the flow of research and ideas into the public and

AN ICAT
TRANSDISCIPLINARY
TEAM collaborated
with Steelcase to
identify conditions
that affect clinician
workflow and burnout.
Using digital and
physical full-scale
prototypes, the team
enacted clinical care
scenarios to seek
feedback and reflect
on the design.

private spheres through 3 centers at the Virginia Tech's Innovation and Partnerships, formerly known as Virginia Tech's LINK + LICENSE + LAUNCH, a one-stop shop for companies and entrepreneurs that builds partnerships; actively engages with the market; and makes connections for alumni, corporate partners, and federal and state partners. LINK supports strategic partnerships across the university, and now, efforts associated with the Innovation Campus.

In 2022, LICENSE supported 20 new intellectual property licenses, six tech startups, and 148 invention disclosures from the Virginia Tech community. It supported applications for more than 70 patents and three new varieties of plants, with more than 50 patents awarded. LAUNCH initiated a new Proof-of-Concept grant program to provide much needed funding to technologies with potential for real-world application.

The team targeted the kinds of high-demand fields where Virginia Tech thrives, such as autonomy, digital technology, cybersecurity, satellite technologies, transportation, biomedicine, devices and robotics, and agriculture. Not coincidentally, those fields show up in McKinsey's future of work report as high-growth sectors in coming decades.

"We're finding more and better ways to engage with companies and move new discoveries made at Virginia Tech into the marketplace," said Salmon. "That process extends their benefit to more people in the world." ■



INNOVATION AND CREATIVITY COLLIDE in year-long display in Alexandria

By Rodney Kimbangu*
Photos by Craig Newcomb

INNOVATION AND CREATIVITY may only be buzzwords for some, but at the Institute for Creativity, Arts, and Technology (ICAT) at Virginia Tech, they have long served as fuel for its mission.

In the fall of 2023, those words took on additional importance with the launch of “Innovation & Creativity,” a new year-long series of exhibitions, performances, and events highlighting an unprecedented partnership between ICAT and the City of Alexandria’s Office of the Arts.

“Collaborating with one of the nation’s top innovative universities provides an opportunity to put Alexandria on the cutting edge, proving how art and creativity are a thread that runs deeply through all forms of innovation, be it scientific, cultural, engineering, health, or technological,” said Brett Johnson, the city’s curator of artistic advancement.

The exhibitions were held at the Torpedo Factory Art Center’s Target Gallery in Alexandria from September 2023 through

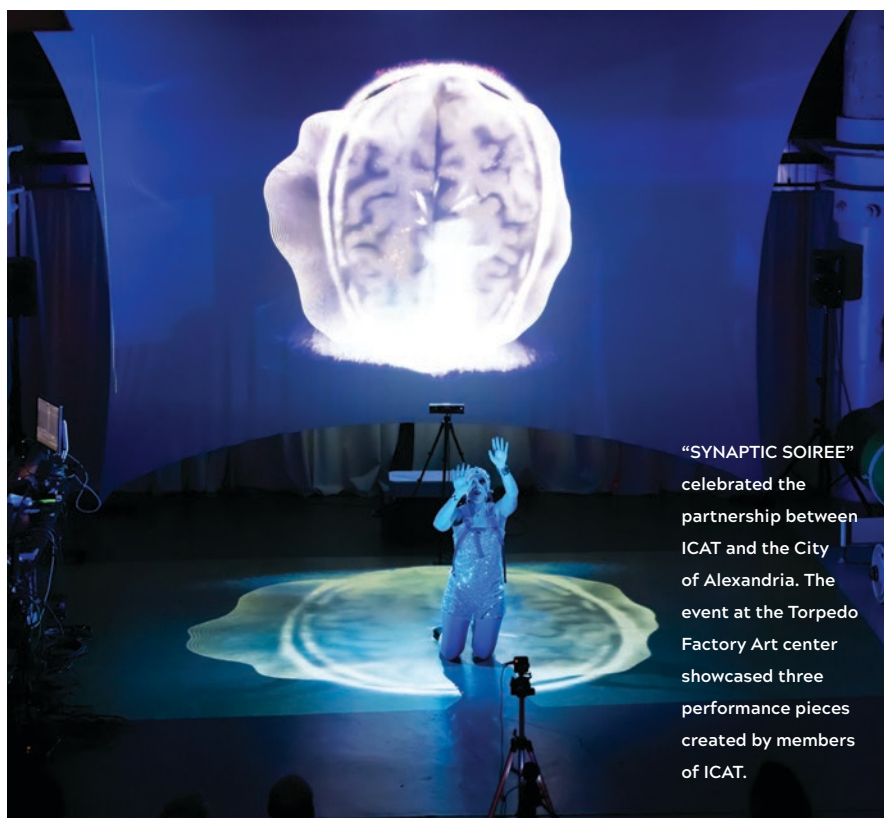
September 2024.

The event’s grand opening, “Synaptic Soiree,” a party and performance, was held at the Torpedo Factory Art Center on Sept. 16, 2023. The evening events featured three projects from ICAT’s vibrant teams of researchers and artists curated specifically for the City of Alexandria and Northern Virginia audiences. A facilitated discussion followed the show.

Growing its more than 50-year presence in the Greater Washington, D.C. Area, Virginia Tech opened its doors to the new Academic Building One in Alexandria the following fall to become a global leader of tech talent and innovation.

Since the beginning of efforts to create the new Academic Building One, the City of Alexandria has worked closely with Virginia Tech.

Out of discussions with David Baker, associate vice president and chief of staff for the Greater Washington D.C. Area, the opportunity for ICAT to join the collaboration and be at the center of innovative projects emerged, showcasing the power of collaboration and celebrating the beauty of diverse academic practices, artistic expressions, and creative endeavors. ■



“SYNAPTIC SOIREE” celebrated the partnership between ICAT and the City of Alexandria. The event at the Torpedo Factory Art center showcased three performance pieces created by members of ICAT.

WATCH
VIDEOS



SYNAPTIC SOIREE



SHAKESPEARE'S
GARDEN



SOUND HORIZONS



"SOUND HORIZONS"



"SHAKESPEARE'S GARDEN" on display in the Target Gallery at the Torpedo Factory Art Center.

THE TORPEDO FACTORY CONNECTION

THE INSTITUTE FOR CREATIVITY, ARTS, AND TECHNOLOGY (ICAT) HAS BUILT a growing collaborative relationship with the Torpedo Factory Art Center through a shared commitment to experimentation, public engagement, and transdisciplinary creativity. What began as an opportunity to exhibit student and faculty work has developed into an ongoing partnership that supports performances, sound installations, and research-informed exhibitions. These efforts connect Virginia Tech's innovation ecosystem with the cultural vibrancy of Alexandria's art community. Through regular programming and co-curated events, the Torpedo Factory now serves as a vital platform for ICAT to reach new audiences, test ideas, and extend the impact of arts-led research beyond campus.

"**Sound Horizons**" opened Aug. 5, 2023 and ran through to Jan. 28, 2024. It included four sound installations:

"**Dear Younger Me**," a project about healing the inner Black girl, which features a series of Black women reading letters to their younger selves.

"**Sonification of Cybersecurity Data**," a music installation that turns cybersecurity data into musical harmony of sounds.

"**Liminal Spaces**," a fixed-media composition inspired by life's in-between moments.

"**Musical Connection**," a sound installation shedding light on the uncharted neural territories that music traverses when people living with Alzheimer's disease engage in music-making.

Gallery visitors experienced the exhibition through ICAT's Tesseract, a high-density loudspeaker array that physically immerses listeners in sound.

Virginia Tech creates **IMMERSIVE DISPLAY** for National D-Day Memorial

By Rodney Kimbangu*



Luke Hayes

Courtesy of David Fransulich

THE NATIONAL D-DAY MEMORIAL FOUNDATION added layers of immersion to the 2024 D-Day remembrance with the help of Virginia Tech’s Institute for Creativity, Arts, and Technology (ICAT).

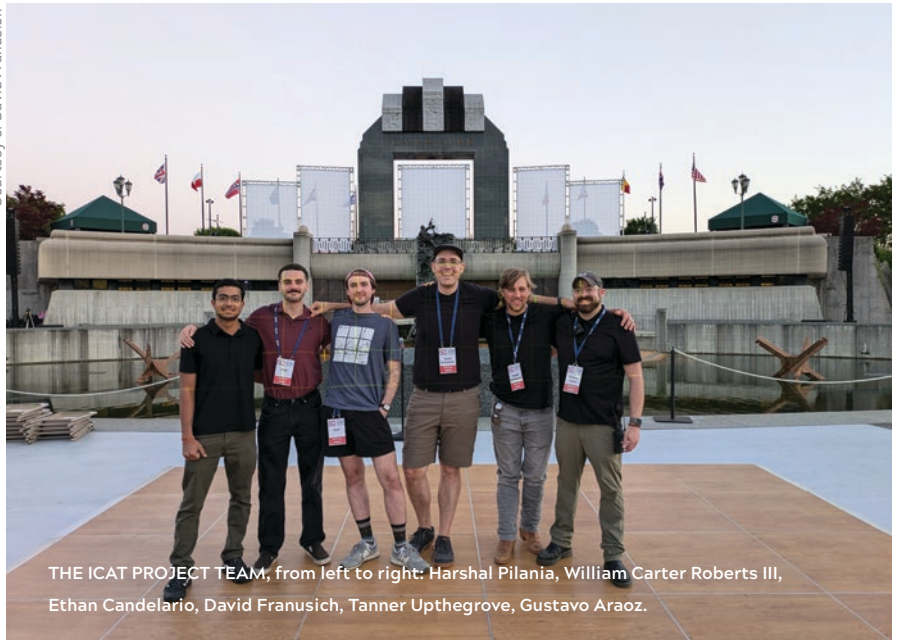
“D-Day changed our world, and the men and women who participated should never be forgotten,” said April Cheek-Messier, president and chief executive officer of the foundation. “It was a pivotal event in our history, and it is now the responsibility of each of us as citizens to reflect on what they did to preserve freedom for us all.”

June 6, 2024 marked the 80th anniversary of the allied forces’ invasion of Normandy, France, during World War II. It also marked the first time the ceremonies at the National Memorial located in Bedford, Va., included moving pictures and sound.

“We wanted to do something we had never done before with a truly immersive experience that would envelop the crowd,” Cheek-Messier said.

The experience consisted of a short audio-visual production, written and created by ICAT and the foundation, that will include first-hand accounts and utilize the memorial itself as the literal backdrop.

“It’s a 25-minute projection show, telling the story of D-Day through first-hand accounts,” said David Fransulich, ICAT’s multimedia designer on the project. “We accomplished it using archival illustrations, photos, and film footage—carefully assembled, animated, and pro-

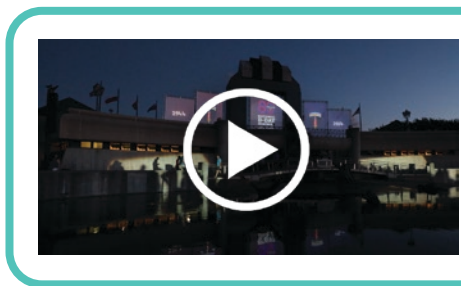


THE ICAT PROJECT TEAM, from left to right: Harshal Pilia, William Carter Roberts III, Ethan Candelario, David Fransulich, Tanner Upthegrove, Gustavo Araoz.

jection-mapped along with spatialized audio.”

The National D-Day Memorial officially opened in 2001 as a tribute to the largest amphibious assault in history, which is generally recognized as a major turning point in World War II. Bedford was selected as its location because the town lost 20 residents who served as a result of the invasion, making it the

“We also wanted to reach an even younger audience and engage them in a new way while detailing the D-Day story and why it still matters today,” Cheek-Messier said. “Having worked with Virginia Tech through the years, including a close relationship with the Virginia Tech Corps of Cadets, we felt it would be the perfect partnership. We knew that ICAT had the creativity and talent to make our vision a reality.”



The collaboration was reflective of both ICAT’s mission to bring together people across disciplinary boundaries to harness artistic expression in ways that benefit society and Virginia Tech’s motto, *Ut Prosim* (That I May Serve).

United States’s highest known per capita D-Day loss.

Cheek-Messier said previous celebrations have always held the utmost importance for the foundation, but as veterans age and pass away, the 80th anniversary could have been the last significant opportunity to thank many of them publicly.

“It is an honor for ICAT to contribute to this national moment of remembrance,” said Ben Knapp, former ICAT executive director. “I am proud of the uniquely transdisciplinary team of students and faculty at ICAT who used collaborative and iterative design to create a compelling narrative brought to life with a multimodal array of lighting, projection-mapped visuals, and immersive audio.”

* Originally published by Virginia Tech News on May 30, 2024. Edited for length and content.

STRATEGIC INITIATIVES

Shaping the future through vision and experimentation

AT ICAT, BOLD QUESTIONS drive exploration.

Whether probing the human-AI relationship, forging international research networks, or rethinking the role of the arts in innovation ecosystems, ICAT's strategic initiatives help shape what comes next. These efforts go beyond research; they lay the foundation for cultural, scientific, and technological shifts that ripple far beyond the university. Through convenings, global exchanges, and national partnerships, ICAT continues to lead initiatives that aim to redefine how creativity informs discovery, collaboration, and impact.



@superclubvideo (instagram id) and CIRMMT

ERIC LYON prepares for "ICAT at CIRMMT" concert at McGill University in Montreal.

USING ART AND INNOVATION By Lindsey Haugh* to solve industry's problems

WHAT IS THE CONNECTION between artists, designers, and broad societal innovation as it relates to economic and job growth?

This question was one of three explored by Virginia Tech's Institute for Creativity, Arts, and Technology (ICAT) as a National Endowment for the Arts (NEA) Research Lab, part of a \$34 million nationwide investment in the arts. ICAT was one of only four organizations in the country to receive funding and the Research Lab designation.

"In this research lab, we explored how organizations outside universities incorporated the creative process into their work practices and how that might inform the ways we help our students succeed after they graduate," said Ben Knapp, ICAT's former executive director and the project's principal investigator.

Working in partnership with Leonardo, an international network of artists, scientists, technologists, and scholars, ICAT researchers applied a framework known as da Vinci's Cube. The model expanded on Pasteur's Quadrant by integrating aesthetics and human-centered design into traditional approaches to basic and applied research, emphasizing innovation that engaged emotion, sensory experience, and meaning.

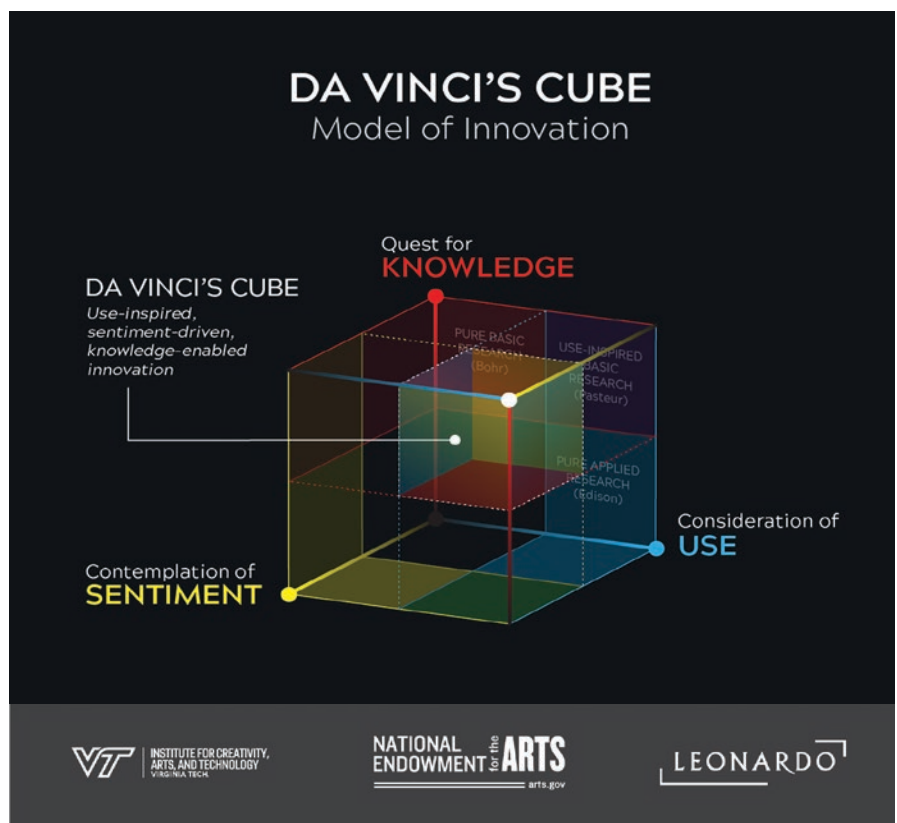
The research team included Knapp; co-principal investigators Tom Martin, ICAT co-interim executive director and professor of electrical and computer engineering; Lisa McNair, ICAT co-interim executive director and profes-

sor of engineering education; Diana Ayton-Shenker, chief executive officer of Leonardo; and Termeh Rassi, Leonardo's chief strategy officer.

Using a mixed-methods approach, the team collected evidence of historical, contemporary, and emerging examples of arts-integrated entrepreneurship and innovation. An advisory committee contributed additional insight and included representatives from the Alliance for the Arts in Research Universities, the Smithsonian's Lemelson Center for the Study of Invention and Innovation, and corporate partners.

Phase 1 research unfolded across three phases: a systematic literature review, interviews with businesses employing arts-integrated practices, and convenings of industry leaders and practitioners engaged in arts-based innovation. Findings informed the development and evaluation of a pilot program that embedded creative professionals within industry settings to foster cross-disciplinary collaboration.

Outcomes from the lab include evidence-based publications, best practices for arts-integrated innovation, and a collection of scholarly articles. ■



* Originally published by Virginia Tech News on March 31, 2023. Edited for length and content.

ICAT sparks INTERNATIONAL COLLABORATION with an art exchange

By Rodney Kimbangu*

SURROUNDED by an immersive 140-channel audio system with saxophone in hand, Kyle Hutchins played a song. The immersive sound enveloped the five-story-high, state-of-the-art theatre and laboratory known as the Cube at Virginia Tech.

“Immediately afterward, I realized: There is nothing else I can do with this piece because there is nowhere else for the music to be presented,” said Hutchins, assistant professor of practice at Virginia Tech’s School of Performing Arts. “A stereo version will never be remotely the same experience.”

The difficulty of duplicating this work elsewhere inspired the creation of the Art, Research, and Technology Exchange (ARTx), a multiple-institution network of such specialized venues. Since its founding in Blacksburg, ARTx has grown to include more than 10 universities and organizations across the globe and has given Virginia Tech researchers the opportunity to lecture, perform, and engage internationally.

“ARTx is an incredible global distinction initiative to advance the arts and technology,” said Ben Knapp, former executive director of the Institute for Creativity, Arts, and Technology (ICAT). “We are proud to support it and continue fostering innovation and collaboration on an international scale.”

ARTx already has completed multiple iterations of its “art exchange” program.

In 2024, Virginia Tech faculty have visited institutions in Canada and Ireland, and the university has hosted faculty from abroad.

Founded by Knapp and directed by Hutchins, ARTx is supported by ICAT and Outreach and International Affairs at Virginia Tech.

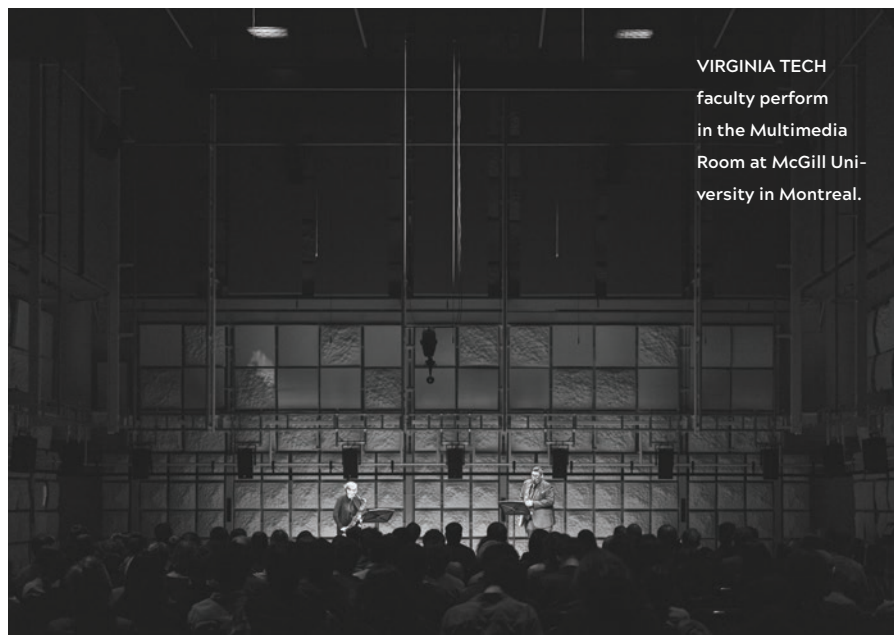
“In our increasingly interdependent world, initiatives such as ARTx exemplify Virginia Tech’s commitment to fostering meaningful global partnerships at the nexus of arts and technology with leading universities around the world,” said Guru Ghosh, vice president for Outreach and International Affairs. “This program not only advances our research capabilities

in these fields, but also creates vital channels for cross-cultural dialogue and innovation.”

First exchange: April to October 2024

In spring 2024, ARTx hosted a group of researchers from the Centre for Interdisciplinary Research in Music Media and Technology (CIRMMT) at McGill University in Montreal on the Blacksburg campus.

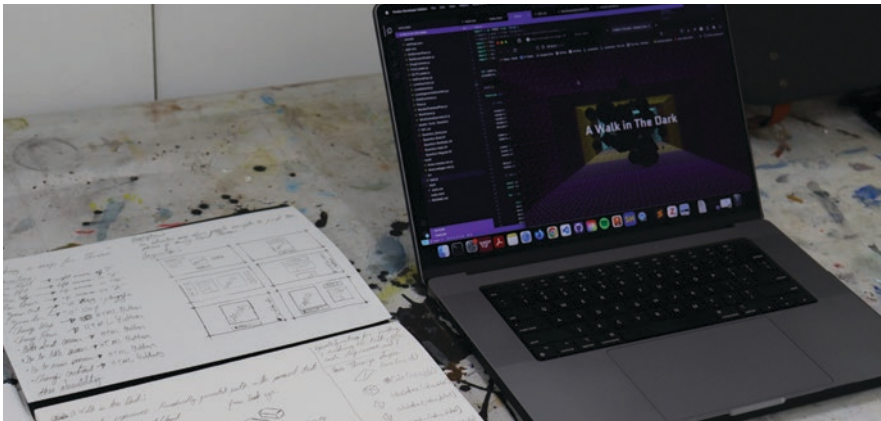
“They came here last spring and performed in the Cube during the New Music + Technology Festival. We went there in the fall,” Hutchins said. “Next year, we’ll host another delegation from the center. Hopefully, this project will



VIRGINIA TECH
faculty perform
in the Multimedia
Room at McGill Uni-
versity in Montreal.

@superclubvideo (instagram id) and CIRMMT

Chelsea Thompto



continue in the long term, alternating every other year.”

The center is an interdisciplinary research space made up of members from five universities in Montreal. Mirroring ICAT, the center features the Multimedia Room, a 70-channel peer studio of the Cube.

Knapp and Hutchins, along with School of Performing Arts faculty Charles Nichols, Eric Lyon, Betsy Lantz, and John Irrera, took part in the initial trip last October.

They spent five days presenting their research, giving six lectures, and performing the five-piece performance “ICAT at CIRMMT.”

Additionally, they established an ARTx SEAD grant of up to \$12,000 to foster collaboration between Virginia Tech and McGill University. The funding supported two teams, one at each institution, to create work for the Cube and the McGill Multimedia Room to be exhibited in 2026.

Second exchange: September to November 2024

In the fall of 2024, New Music + Technology Festival, Irish artists Ruth Clinton and Niamh Moriarty participated in an art residency at Virginia Tech. They engaged with students on the Blacksburg campus, giving research presentations, performing in the Cube, and teaching a

class.

In November, assistant professor of creative technologies Chelsea Thompto spent two weeks in Ireland. Her first four days were spent at the Center for Creative Technologies at the University of Galway, where she worked in the studio as part of her residency. She then spent three days at Burren College of Art, giving talks, sharing her work, and meeting with undergraduate and graduate students.

The remainder of her residency allowed her to develop a project she had planned in 2023 before returning to the University of Galway to conclude the exchange.

“I went from no material but with a brief idea to a working prototype of my project in about two weeks,” she said.

Upon returning to Galway, Thompto participated in a workshop on diversity and inclusion in virtual reality and extended reality spaces led by Ida XR. She also reconnected with Clinton and Moriarty to engage with their work on display at the City Museum of Galway, continuing the conversations sparked during their Blacksburg residency.

As ARTx continues to evolve, its mission to bridge the arts and technology across borders will continue to create artistic opportunities and a global community of researchers aimed at redefining how creativity and research intersect on an international scale. ■

New Music + Technology FESTIVAL

THE VIRGINIA TECH NEW MUSIC + TECHNOLOGY FESTIVAL (NMTF)

is a biannual, multi-day event that celebrates experimental music, new music, performance, multimedia, and interdisciplinary research.

Founded in 2021 and directed by Kyle Hutchins, assistant professor of practice in the School of Performing Arts, the festival features professional concerts, listening lounges, lectures, technical demonstrations, student works, and installations.

Events are held across campus in venues such as the Cube, Perform Studio, Sandbox, Squires Student Center’s Perspective Gallery and Recital Salon, and the Creativity and Innovation District Living-Learning Community’s Assembly and Performance Hall.

The festival highlights diverse disciplines, including music, theater, cinema, dance, visual art, creative coding, computer science, neuroscience, molecular biology, robotics, and cybersecurity.

READ MORE

ABOUT NMTF



www.icat.vt.edu

